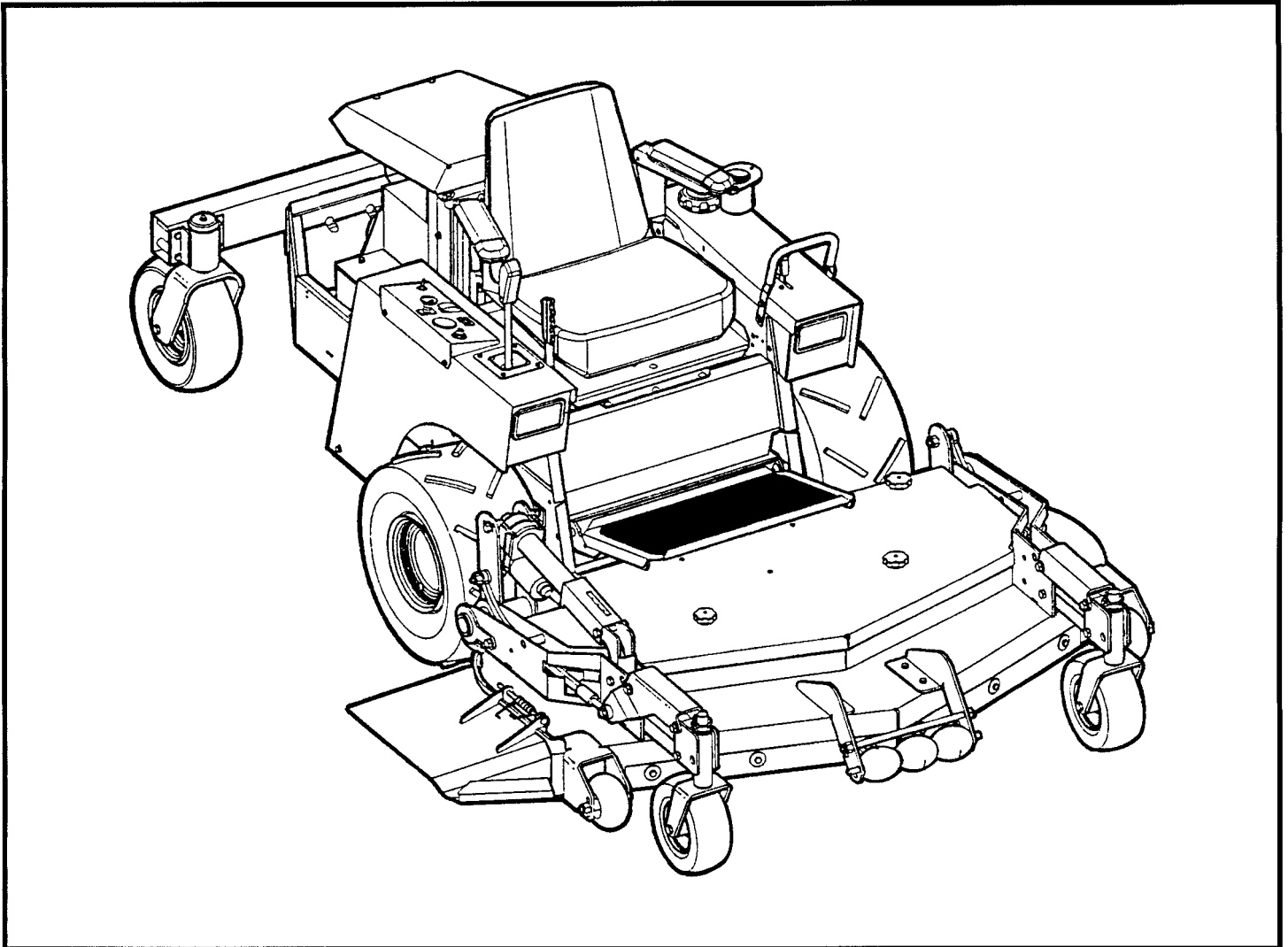


SNAPPER[®]

OUT FRONT Z-RIDER



SERVICE MANUAL

SNAPPER[®] McDonough, GA., 30253 U.S.A.

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SERVICE MANUAL

for SNAPPER OUT FRONT Z-RIDERS

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Section I

GENERAL

INFORMATION

CONTENTS

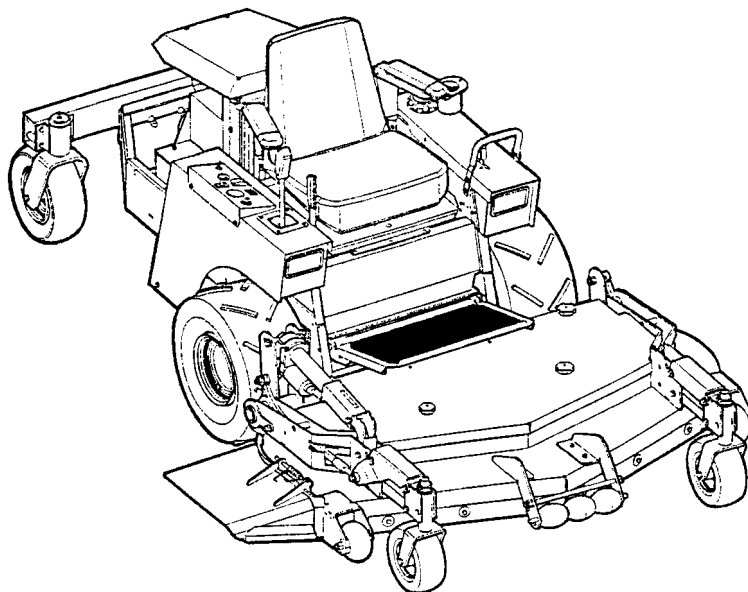
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Section I - GENERAL INFORMATION

1.1 MASTER PROFILES FOR MODELS BUILT FROM 1996 THRU 1999

OUT FRONT Z-RIDER - '96

POWER UNITS	MOWER DECKS
ZF2200K - 82371	ZF6100M (61" Deck) - 82385 ZF5200M (52" Deck) - 82459
Literature Pack - 5-4286 Operator Manual - 3-5899 Dealer Set-Up - 3-5892 Parts Manual - 06106	



OUT FRONT Z-RIDER - '97

POWER UNITS	MOWER DECKS
1) ZF2200K - 82371	ZF5200M (52" Deck) - 82459
1) ZF2500K - 82517	ZF6100M (61" Deck) - 82385
1) Literature Pack - 5-7724 Operator Manual - 4-6480 Dealer Set-Up - 3-5892 Parts Manual - 06106	

OUT FRONT Z-RIDER (Diesel) - '97

POWER UNITS	MOWER DECKS
1) ZF2100DKU - 82512	ZF5200M (52" Deck) - 82459 ZF6100M (61" Deck) - 82385
1) Literature Pack - 5-4629 Operator Manual - 4-5182 Dealer Set-Up - 3-5892 Parts Manual - 06113	

OUT FRONT Z-RIDER - '98

POWER UNITS	MOWER DECKS
1) ZF2500KH - 84343	1) ZF5200M (52" Deck) - 84344 2) ZF6100M (61" Deck) - 84345 3) ZF7301M (73" Deck) - 84278
1) Literature Pack - 5-7724 Operator Manual - 4-6480 Dealer Set-Up - 3-5892 Parts Manual - 06106	
2) Literature Pack - None	
3) Literature Pack - 5-8002 Operator/Dealer Set-Up - 4-7174 Parts Manual - 4-7173 Parts Manual - 06125	

OUT FRONT Z-RIDER (Diesel) - '98

POWER UNITS	MOWER DECKS
1) ZF2500DKH - 84342	ZF5200M (52" Deck) - 82459
2) ZF2300GKU - 84271	ZF6100M (61" Deck) - 82385
1) Literature Pack - 5-4629 Operator Manual - 5-5182 Dealer Set-Up - 3-5892 Parts Manual - 06113	
2) Literature Pack - 5-6429 Operator Manual - 4-5182 Dealer Set-Up - 3-5892 Parts Manual - 06113	

OUT FRONT Z-RIDER - '99

POWER UNITS	MOWER DECKS
1) ZF2500KH - 84409	1) ZF5200M (52" Deck) - 84434 2) ZF6100M (61" Deck) - 84435 3) ZF7301M (73" Deck) - 84441
1) Literature Pack - 5-7724 Operator Manual - 4-6480 Dealer Set-Up - 3-5892 Parts Manual - 06106	
2) Literature Pack - None	
3) Literature Pack - 5-8002 Operator/Dealer Set-Up - 4-7174 Parts Manual - 4-7173 Parts Manual - 06125	

OUT FRONT Z-RIDER (Diesel) - '99

POWER UNITS	MOWER DECKS
1) ZF2100DKU - 84410	ZF5200M (52" Deck) - 84434
1) ZF2300GKU - 84411	ZF6100M (61" Deck) - 84435
2) EZF2100DKU - 84350	EZF6100M (61" Deck) - 84351
1) Literature Pack - 5-4629 Operator Manual - 4-5182 Dealer Set-Up - 3-5892 Parts Manual - 06106	
2) Literature Pack - 5-8677 Operator Manual - 7-3065 Dealer Set-Up - 7-3067 Parts Manual - 06113	

NOTE

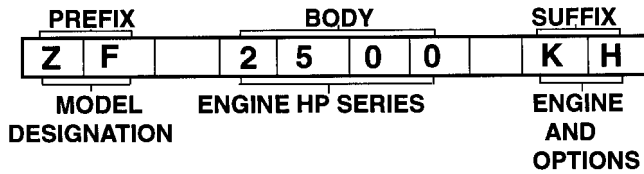
Model Number Explanations are graphically shown on Page 1.3. Please learn this identification system. It will help in many ways.

Section I - GENERAL INFORMATION

1.2 MODEL NUMBER EXPLANATIONS

POWER UNITS

EXAMPLE 1



EXAMPLE 2

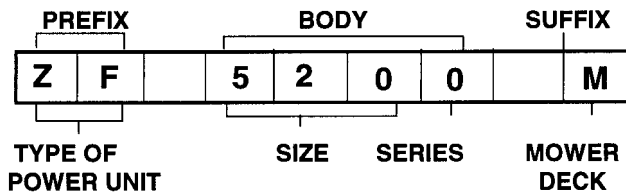


EXPLANATION

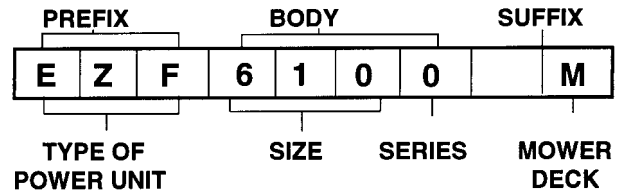
PREFIX	BODY	SUFFIX
*E - European Market Z - Zero Turning - Hydro **F - Front Mounted Mower	21 - 21 HP 23 - 23 HP 25 - 25 HP 00 - Series Designation	KH - Kohler Engine DKU - Kubota Diesel Engine GKU - Kubota Gas Engine

MOWER UNITS

EXAMPLE 1



EXAMPLE 2



EXPLANATION

PREFIX	BODY	SUFFIX
*E - European Market Z - Zero Turning - Hydro Drive F - Front Mounted Mower	52 - 52" Mower Cutting Width 61 - 61" Mower Cutting Width 73 - 73" Mower Cutting Width 00 - Series Designation 01 - Series Designation	M - Mower Deck

- When Used, It Is Always First Letter of Model Number
- Appears After First or Second Letter Of Model Number

Section I - GENERAL INFORMATION

INTRODUCTION

1.3 HOW TO USE THIS MANUAL

This manual contains the Service and Maintenance information required to properly inspect, service and repair the OUT FRONT Z-RIDER Power Units and their compatible Mower Units (ZF5200M, ZF6100M & ZF7301M).

The manual is divided into sections for quick, easy reference. Carefully read all procedures described for servicing a particular component **BEFORE** repairs are started, to avoid needless disassembly.

NOTE

References to the RIGHT and LEFT sides are determined by facing forward while sitting in the Operator's Seat.

1.4 WARNINGS & CAUTIONS

Details of standard workshop safety procedures are not included in this manual. WARNINGS & CAUTIONS occur where procedures, if improperly performed, could cause personal injury, and/or damage to the unit or its components. These WARNINGS & CAUTIONS do not cover all conceivable ways hazardous consequences could be created by improperly following the instructions or by the incorrect use of service tools.

1.5 SERIAL NUMBER LOCATION

The Unit Serial Number is located on the inside of the rear of the right hand fender.

1.6 TOOL REQUIREMENTS

The normal complement of U.S. Standard tools found in most repair shops are all that will normally be needed to repair **SNAPPER OUT FRONT Z-RIDERS**. Special tools and meters are mentioned where needed in the manual. Refer to the specified Parts Manual for special tools available through **SNAPPER** Dealers.

NOTE

Throughout the following sections of this manual, you may find the abbreviations **ZF** or **OFZ** being used in lieu of **OUT FRONT Z-RIDER**. These are acronyms of common usage to describe various models of the machine.

1.7 SPECIFICATIONS - GENERAL

A. ENGINE SPECIFICATIONS

Refer to the Engine Manufacturer's Manuals.

B. HYDRO TRANSAXLE SPECIFICATIONS

The Power Units covered in this manual will have the following Hydro Transaxle Combinations:

1. Eaton 771A (R.H.), 771B (L.H.)
2. Refer to the Hydro Transaxle Manufacturer's Shop Manuals for repair procedures.





C. TIRE SPECIFICATIONS

The Power Units covered in this manual are furnished with tires having four (4) different parts num-

bers. Traction Tire Pressures are to be maintained at 12 PSI while Caster Tires are to be kept at 25 PSI.

1.8 SPECIFICATIONS - TORQUE VALUES

Standard Torque Specifications and Capscrew Markings Chart. The values given here are based on the use of clean and dry threads. Reduce torque by 10 percent when threads are lubricated with engine oil and by 20 percent if new plated capscrews are used.

CAPSCREW HEAD MARKINGS				
Manufacturer's Marks may vary. Three-line markings on heads shown below - for example, indicate SAE Grade 5.				
				
SAE 1 or 2	SAE 5	SAE 6 or 7	SAE 8	
CAPSCREW BODY SIZE Inches - Thread	SAE 1 or 2 Torque Ft - Lb	SAE 5 Torque Ft - Lb	SAE 6 or 7 Torque Ft - Lb	SAE 8 Torque Ft - Lb
1/4 - 20	5	8	10	12
- 28	6	10		14
5/16 - 18	11	17	19	24
- 24	13	19		27
3/8 - 16	18	31	34	44
- 24	20	35		49
7/16 - 14	28	49	55	70
- 20	30	55		78
1/2 - 13	39	75	85	105
- 20	41	85		120
9/16 - 12	51	110	120	155
- 18	55	120		170
5/8 - 11	83	150	167	210
- 18	95	170		240
3/4 - 10	105	270	280	375
- 16	115	295		420



1.9 WORKSHOP SAFETY HINTS

- A. DO NOT run engine in an enclosed area - exhaust fumes are hazardous to your health.
- B. DO NOT smoke, light a fire or create any sparks near gasoline or diesel fuel - both are flammable, gasoline in particular.
- C. DO NOT use gasoline as a solvent. Fumes are dangerous. Always use non-flammable solvents.
- D. DO NOT store gasoline in an area where sparks or flames are present such as near water heaters or furnaces - gasoline fumes are extremely explosive.
- E. ALWAYS disconnect the spark plug wires and secure the ends away from the plug BEFORE inspecting, servicing or repairing the unit or attachments. Precautions prevent accidents such as unintentional start-ups!

Section I - GENERAL INFORMATION

- F. ALWAYS make adjustments and do repairs in a well-lit and well-ventilated area.
- G. ALWAYS wear protective safety goggles when using pressurized air to clean the machine or parts.
- H. DO NOT use a jack to support the **OUT FRONT Z-RIDER** in a raised position. Use a chain hoist, "jack stands" or other stable supports that will hold up BOTH sides of the frame at the same time. This approach is especially important when raising and supporting the rear end of the unit. When lifting the rear of the unit (with deck attached), the mower deck caster wheels may pivot - therefore, both sides of the rear frame **MUST** be securely supported. Be sure to chock (block) the front caster wheels.

NOTE
Read the Operator's and Engine Owner's Manuals and instructions BEFORE operating equipment.

	WARNING	
<p>If welding repairs are to be made on the OUT FRONT Z-RIDER, observe the following precautionary steps before welding:</p> <ul style="list-style-type: none">A. ALWAYS disconnect or remove the battery.B. ALWAYS attach grounding lead a minimum of 2 FEET (24") from area to be welded. <i>(Make certain welder ground is not located at a seal or bearing).</i>C. ALWAYS shut-off fuel supply valves.D. ALWAYS make sure that fuel tank caps are tightened securely.E. ALWAYS drape fuel tanks with wet towels.F. ALWAYS keep a fire extinguisher and other fire fighting apparatus close by.G. ALWAYS practice SAFETY when welding!		

Section II

TROUBLESHOOTING

CONTENTS

<u>ITEM</u>	<u>PAGE No.</u>
Engine	2.2 - 2.3
Hydro Transaxle (Traction Drive)	2.3
Mower Unit	2.3 - 2.4
Battery	2.4
Maintenance Parts Chart	2.4
Service & Lubrication Chart	2.5
Service Schedule	2.6

Section II - TROUBLESHOOTING

ENGINE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Starter Will Not Crank Engine.	Battery dead. Blown Fuse. Electrical connections loose or corroded. Defective Ignition Switch. Broken or frayed wire in Ignition Wiring. Worn or defective Starter Gear.	Service Battery. Replace Fuse. (Fuse Panel under instrument panel). Clean and check connections for good contact. Replace Ignition Switch. Inspect Wiring. Repair any Wiring problem. Replace Starter Gear.
Engine Will Not Start.	Blade Engagement Switch in the "ON" position. Park Brake not set. Fuel Tank empty. Fuel Filter clogged. Fuel Cock in the "OFF" position. Engine needs choking. Spark Plug Wire disconnected. Battery weak or dead. Faulty Parking Brake, Blade or Ignition Switch.	Move Blade Engagement Switch to "OFF". Set Park Brake. (Gas Engine). Fill Fuel Tank with fresh fuel. (Diesel Engine). Fill Fuel Tank with fresh Diesel Fuel. (Gas Engine). Replace Fuel Filter. (Diesel Engine). Remove and clean Fuel Filter of debris. Move Fuel Cock Lever to the "ON" position. Move Choke Control to "CHOKE" position. Place Spark Plug Wire onto Spark Plug. Service Battery. Repair or replace faulty component.
Engine Stalls After Running.	Operator not in Seat. Choke Control in the "CHOKE" position. Fuel Tank empty. Fuel Injection Nozzle clogged with carbon. Insufficient lubrication. Fuel Filter clogged. Engine Air Pre-Cleaner and/Air Cleaner dirty. Spark Plug defective or gap set improperly. Water, debris or stale fuel in Fuel System.	Sit in Operator's Seat. Move Choke Control to "OFF" position. Fill with Fuel to proper level. (Diesel Engine). Clean or replace Fuel Injection Nozzle. Check engine oil lubrication system. (Gas Engine). Replace Fuel Filter. (Diesel Engine). Remove and clean Fuel Filter of debris. Clean free of all debris. Service Spark Plug. Drain and clean Fuel System.
Engine Loses Power.	Excessive load on Engine. Engine Air Pre-Cleaner or Air Cleaner dirty. Engine Oil Level low. Engine Cooling Fins & Air Intake Screen excessively dirty. Fuel Injection Nozzle clogged with carbon. Spark Plug faulty. Water, debris or stale fuel in Fuel System.	Lessen load. Clean or replace Filters. Fill with Engine Oil to proper level. Clean Cooling Fins, Air Intake Screen of all debris. (Diesel Engine). Clean or replace Fuel Injection Nozzle. Service Spark Plug. Drain and clean Fuel System.
Engine Backfires When Turned to "STOP".	Throttle Control set to "FAST" position.	Set Throttle Control to "SLOW" and allow Engine to idle. Then, turn Key to "OFF".
Excessive Vibration.	Damaged or bent Mower Blade(s). Loose Blade components. Loose or missing Air Lift (if equipped). Frayed or damaged Belts. Loose or damaged Pulleys.	Service Mower Blade(s). Service and tighten loose parts. Replace Air Lifts. Tighten to proper torque. Replace Belts. Inspect and tighten/replace.

(Troubleshooting Continued on Next Page)

Section II - TROUBLESHOOTING

ENGINE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Engine Overheats. (Water-Cooled Engines)	Insufficient Engine lubrication. Fan Belt broken or out of adjustment. Insufficient Coolant Level. Thermostat defective. Radiator Screen or Radiation Cooling Fins clogged. Water Pump, Fan & Radiator Cap defective. Incorrect Fuel Injection Timing. Excessive concentration of antifreeze. Cooling System clogged with debris.	Check Engine Oil Lubrication System. Replace Fan Belt or adjust to proper tension. Check Coolant Level and replenish supply. Replace Thermostat of correct heat range. Clean all debris from Radiator Screen and Fins. Replace Cooling System parts that are defective. Adjust Fuel Injection Timing until correct. Change Coolant (water/antifreeze) mixture ratio. Drain and flush Cooling System.

HYDRO TRANSAXLE (Traction Drive)

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Tractor Will Not Move.	Joystick in the Neutral "N" position. Motion Control Levers in the Neutral "N" position. Roll Release Lever is in "ROLL" position. Low Transmission Hydraulic Oil level. Parking Brake engaged.	Place Joystick in desired speed position. Move Control Levers to desired speed. Move Roll Release Lever to the engage position. Bring Hydraulic Oil to proper level. Move Parking Brake to disengaged position.
Loss of Traction.	Traction Drive Belt requires replacement.	Replace Traction Drive Belt. (See MAINTENANCE PARTS, Pg. 2.4).

MOWER UNIT

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Blade(s) Not Cutting	Blade Engagement Switch in the "OFF" position. Clutch Belt slipping.	Move Blade Switch to the "ON" position. Replace Clutch Belt. (See MAINTENANCE PARTS, Pg. 2.4). Replace Mower Belt. Adjust or replace Electric Clutch. Repair or replace Gearbox. Connect Power Transfer Shaft or repair damage.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>NOTE See Section VIII for Detailed "Corrective Action" in Solving Cutting Problems.</p> </div>		
Cutting Grass Improperly. (See Section VIII).	Uneven Tire Pressure. Cutting Height too low or high. Engine speed too slow. Forward speed too fast. Terraced cut, side-to-side. Excessive Deck pitch, front to rear. Cutting Blade(s) dull or damaged. Blade Belt slipping. Check Electric Clutch. Check Clutch Belt. Check Gearbox for damage.	Bring to proper pressure. Adjust Cutting Height. Move Throttle Control to "FAST" position. Move Motion Control Levers to a slower speed. Adjust side-to-side level. Adjust front to rear level. Sharpen Cutting Edges or replace Blade(s). Replace Blade Belt. (See MAINTENANCE PARTS on Pg. 2.4). Adjust to proper specifications. Replace Clutch Belt. (See MAINTENANCE PARTS on Pg. 2.4). Repair or replace Gearbox.
Poor Grass Discharge. (See Section VIII).	Engine speed too slow. Forward speed too fast. Grass is wet. Excessively worn or damaged Blade(s). Buildup of grass clippings and debris under Deck. Improper Blade(s) installed on Deck. Blade(s) installed improperly on Deck.	Move Throttle Control to "FAST" position. Move Motion Control Levers to a slower speed. Mow when grass is dry. Service Mower Blade(s). Clean Deck. Install proper SNAPPER Blade(s). Install Blade(s) properly.

Section II - TROUBLESHOOTING

MOWER UNIT (Continued from Page 2.3)

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Deck Will Not Lift Properly.	Loose or disconnected Electrical Harness. Electric Screw Jack malfunctioning. Key Switch is in "OFF" position.	Connect Electrical Harness Repair/replace Electric Screw Jack. Turn Key Switch to "ON" position.
Oil Leaking.	Loose or missing Hydraulic Reservoir Cap. Leaking Hose Fittings, Clamps or Reservoir.	Check oil level and replace Reservoir Cap. Verify Fittings and Hose Clamps are tight.

BATTERY

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Battery Will Not Charge.	Poor Cable connections. Bad Battery Cell(s). Faulty Alternator. Blown Fuse.	Clean Cables and Battery Terminals. Replace with new Battery. Repair or replace Alternator. Replace Fuse.

MAINTENANCE PARTS

REPLACEMENT PARTS		POWER UNITS					MOWER UNITS	
ITEM	PART No.	ZF2200K	ZF2500K	ZF2500KH	ZF2100DKU	ZF2300GKU	ZF5200M	ZF6100M
Battery	3-5610	•	•	•	•	•		
Oil Filter, Hydro	4-5184	•	•	•	•	•		
Fuel Filter	4-4777	(Order from KOHLER)						
Mower Blades	2-9246 1-7081 2-9251						• (3) Hi Lift	• (3) Low Lift • (3) Hi Lift
Belt, Mower Deck	4-2776 3-5542						•	•
Belt, Upper Drive Shaft to Hydro Pump	3-5544	• (2)	• (2)	• (2)	• (2)	• (2)		
Belt, Deck Drive Shaft to Electric Clutch	3-5543 4-1830	• (2)	• (2)	• (2)	• (2)	• (2)		

NOTE: For those parts not listed above, consult SNAPPER Parts Manual No. 06106 (REV 2, 11/97).

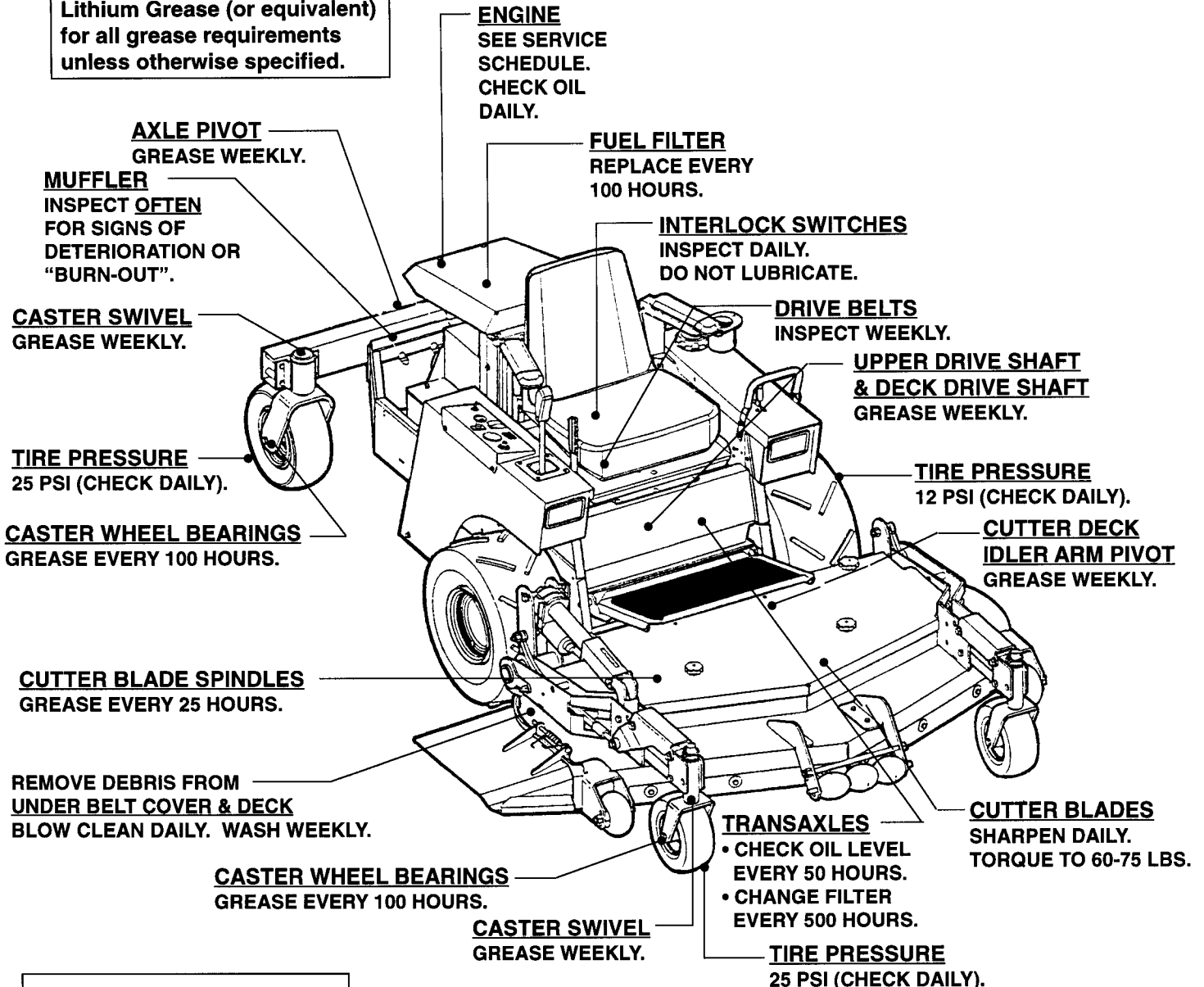
Section II - TROUBLESHOOTING

SERVICE & LUBRICATION CHART

NOTE:

The Power Unit illustrated below is indicative of all models of the SNAPPER OUT FRONT Z-RIDER. It is shown with a representative 52" or 61" Mower Unit attached and is intended to give a general overview of the various components. Use common sense when servicing - if a sliding surface shows signs of wear, it needs lubrication. If a component is equipped with a grease fitting, it requires grease, etc.

NOTE
 Use Kendall NLG1 No.2 Lithium Grease (or equivalent) for all grease requirements unless otherwise specified.



NOTE
 LUBRICATE ALL LINKAGE CONNECTION POINTS WEEKLY WITH A LIGHT COAT OF 30W MOTOR OIL.

Section II - TROUBLESHOOTING

SERVICE SCHEDULE

ITEM	SERVICE PERFORMED	EACH USE	5 HRS	25 HRS	50 HRS	75 HRS	100 HRS	EACH SEASON
Engine Oil	Check Oil Level	X						
	Initial Oil Change		X Gas Eng.		X			
	Periodic Oil Change				X Gas Eng.	X* Diesel		
	Change Oil Filter				X Gas Eng.		X Diesel	
Air Pre-Cleaner	Clean Sponge Element			X** Gas Eng.				
Air Cleaner	Clean or Replace			X** Gas Eng.				X Diesel
Fuel Filter	Replace						X	
Engine Cooling System	Clean Shroud & Fins						X** Kohler	
Engine Cooling System	Clean Radiator Screen & Fins						X** Kubota	
Engine Cooling System	Check Coolant Level							See Engine Manual
Battery	Check Electrolyte						X	X
	Charge Battery							X***
	Testing Battery							X
Tires	Check Air Pressure	X			X			X
Drive Belts	Check For Wear, Damage & Replacement	X						
Mower Deck	Clean Outside & Underside of Debris Accumulation	X						
Lubrication Points	Grease or Oil			X				X
Hydrostatic Trans.Oil	Check Oil Level				X			X
Hydrostatic Trans. Filter	Replace Filter				First Change at 200 Hours. Thereafter every 500 Hours.			

• Change oil every 25 hours when operating under heavy load or high temperatures.

** Clean more often under dusty conditions or when air debris is present.

*** Charge battery every one or two months as specified by Engine Owner's Manual.

Section III

ELECTRICAL

CONTENTS

ITEM	<u>PAGE No.</u>
Introduction	3.2
Starting Circuit	3.2
Wiring Harness	3.2 - 3.3
Cable & Plug Correction Chart	3.3 - 3.4
Wiring Schematics	3.4 - 3.6
Battery	3.7
• Battery Removal	3.7
• Battery Installation	3.7
• Battery Service	3.7
• Battery Testing	3.7 - 3.8
• New Battery Preparation	3.8
Interlock System Analysis	3.9 - 3.10
• Key Switch Test	3.9
• PTO Switch Test	3.10
• Park Brake Switch Test	3.10
• Seat Switch Test	3.10
Deck Lift Switch Test	3.11
IMPORTANT CAUTION - Kubota Engines Only	3.11
Notes	3.12

Section III - ELECTRICAL SYSTEM

INTRODUCTION

The Electrical Systems of the OUT FRONT Z-RIDERS consist of three circuits which are the Ignition, Charging and Starting Circuits. This section covers the Starting Circuit only. Refer to the Engine Manuals for information concerning the Ignition and Charging Circuits - these are Internal Engine Circuits.

3.1 STARTING CIRCUIT (Principle of Operation)

The Safety Interlock System is an electrical loop containing three Interlock Switches; Seat, Park Brake and PTO Control Switch. Activation of the Park Brake will manually lock the Steering Control. The three Interlock Switches MUST be closed at the same time before the Engine can be started. If any of the three are open, the Circuit will not be grounded and the Starting Solenoid cannot be activated.

After the Engine has been started, the PTO Switch can be closed and the Park Brake released to free the Steering Control. The Key Switch must remain open (in RUN position) and the operator must remain in the seat to keep the Seat Switch closed. The Interlock System will "kill" the Engine if the operator vacates the seat UNLESS the PTO Switch (Mower Blade) has been turned OFF, the Steering Control placed in NEUTRAL and the Parking Brake set.

3.2 WIRING HARNESSES

Shown in Figures 3.1 & 3.2 are the Battery Cables and Wiring Harnesses for the OUT FRONT Z-RIDER. These apply to all models. See "Cable & Plug Connection Chart" on Pages 3.3 & 3.4 for connection locations. Wiring Schematics are shown on Pages 3.4, 3.5 and 3.6.

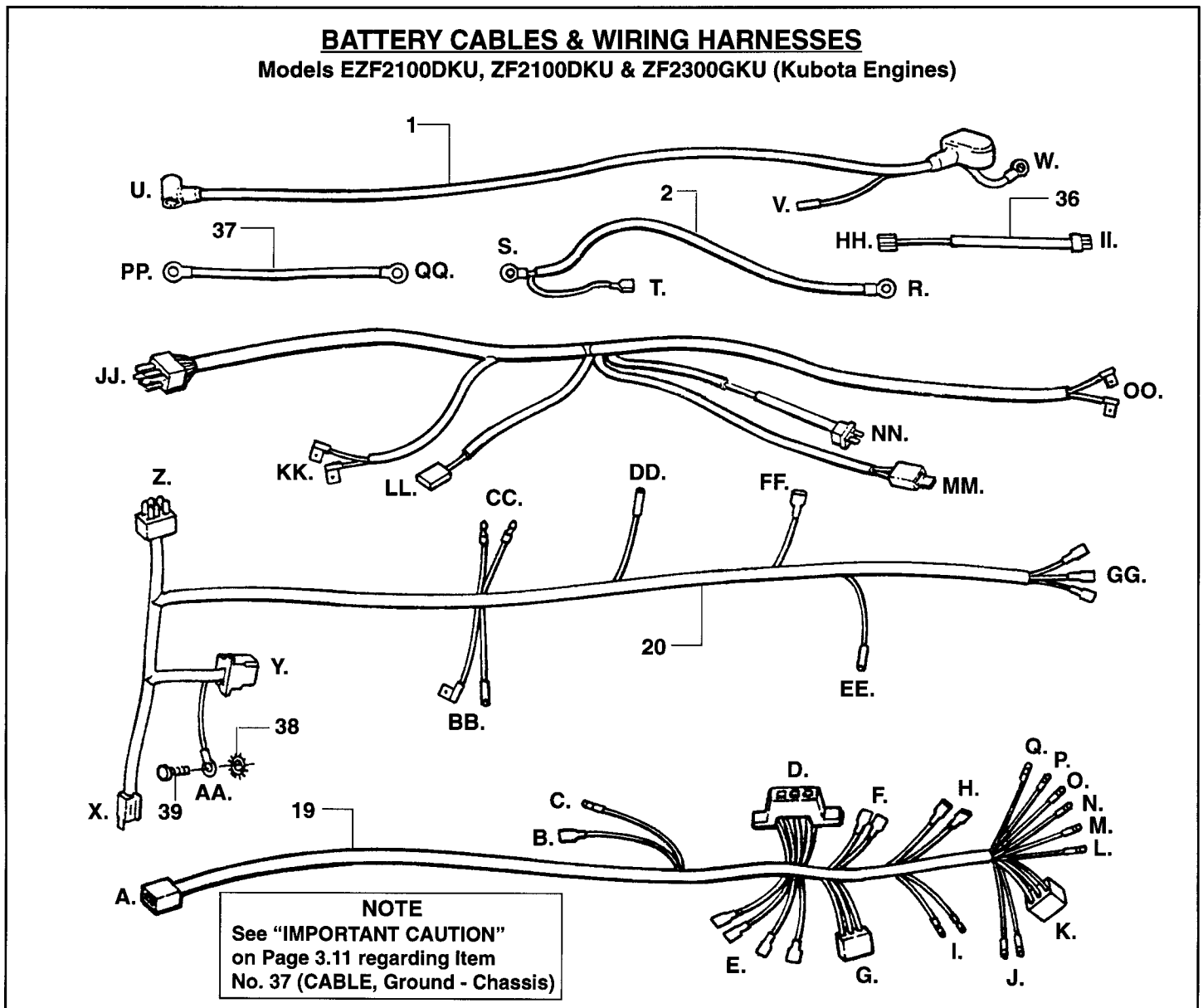


FIGURE 3.1

Section III - ELECTRICAL SYSTEM

CABLE & PLUG CONNECTION CHART (Kubota Engines)

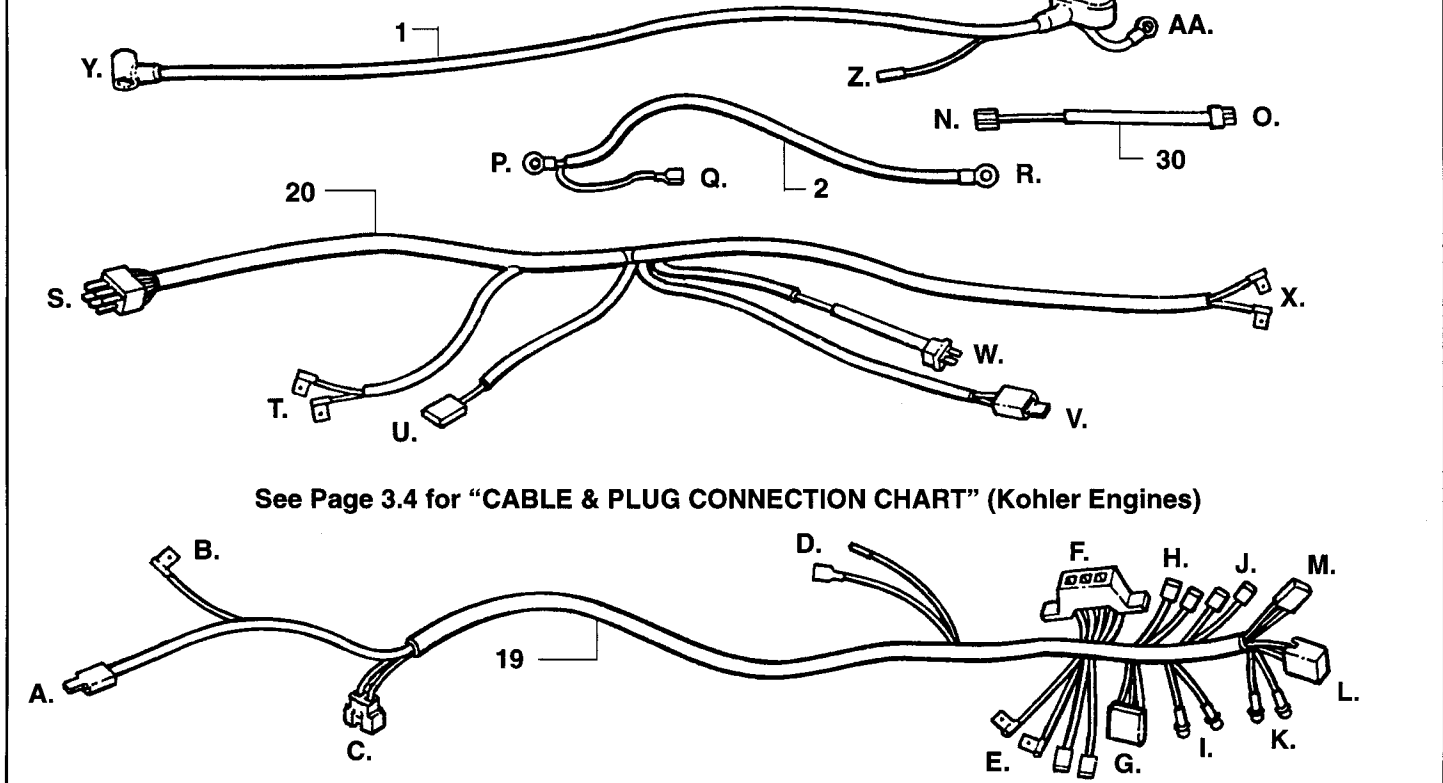
ITEM	PART No.	DESCRIPTION
1	4-5312	CABLE, Battery - Positive
2	4-5311	CABLE, Battery - Negative
19	4-5200	HARNESS, Control Panel (Model ZF2100DKU)
--	4-7240	HARNESS, Control Panel (Model ZF2300GKU)
20	4-5201	HARNESS, D722B-I/D 722EB-1 Kubota Engine
--	4-5334	HARNESS, WG750ELP-1 Kubota Engine
30	4-5334	HARNESS, Front
36	4-2834	HARNESS, Deck Lift
37	4-5310	CABLE, Ground-Chassis (Model ZF2100DKU)
--	5-8364	CABLE, Ground-Chassis (Model ZF2300GKU)

PLUG	CONNECTS TO:	PLUG	CONNECTS TO:	PLUG	CONNECTS TO:
A.	Engine Harness	O.	Terminal "30" (5A)	CC.	Alternator
B.	Battery	P.	Terminal "17" (2A)	DD.	Oil Pressure Sender
C.	Battery	Q.	Terminal "19" (1A)	EE.	Glow Plug
D.	Fuses	R.	Ground (Engine Base)	FF.	Water Temp Sender
E.	Deck Lift	S.	Battery Terminal (Neg.)	GG.	Electric Solenoid
F.	Light Switch	T.	Control Panel Harness	HH.	Electric Screwjack
G.	PTO Switch	U.	Starter Solenoid	II.	Front Harness
H.	Hour Meter	V.	Control Panel Harness	JJ.	Control Panel Harness
I.	Amp Meter	W.	Battery Terminal (Pos.)	KK.	Right Head Light
J.	Buzzer	X.	PTO	LL.	Park Brake Switch
K.	Front Harness	Y.	Regulator	MM.	Seat Switch
L.	Terminal "50" (10A)	Z.	Main Harness	NN.	Deck Lift Harness
M.	Terminal "ACC" (8A)	AA.	Ground (Chassis)	OO.	Left Head Light
N.	Terminal "ACC" (4A)	BB.	Starter Solenoid	PP.	Ground (Engine)
				QQ.	Ground (Frame)

REFER TO
FIGURE 3.1

BATTERY CABLES & WIRING HARNESES

Models ZF2200K & ZF2500K (Kohler Engines)



See Page 3.4 for "CABLE & PLUG CONNECTION CHART" (Kohler Engines)

Section III - ELECTRICAL SYSTEM

CABLE & PLUG CONNECTION CHART (Kohler Engines)

	ITEM	PART No.	DESCRIPTION
REFER TO FIGURE 3.2	1	3-5607	CABLE, Battery - Positive
	2	3-5609	CABLE, Battery - Negative
	19	3-5606	HARNESS, Control Panel
	20	3-5614	HARNESS, Front
	30	4-2834	HARNESS, Deck Lift

PLUG	CONNECTS TO:	PLUG	CONNECTS TO:
A.	Electric Clutch	O.	Front Harness
B.	Starter Solenoid	P.	Battery Terminal (Neg.)
C.	Engine	Q.	Control Panel Harness (Green Wire)
D.	Battery	R.	Ground (Engine Base)
E.	Deck Lift Switch	S.	Control Panel Harness
F.	Fuse Box (Mounted Under Console Panel)	T.	Right Head Light
G.	PTO Switch	U.	Park Brake Switch
H.	Light Switch	V.	Seat Switch
I.	Amp Meter	W.	Deck Lift Harness
J.	Hour Meter	X.	Left Head Light
K.	Buzzer	Y.	Starter Solenoid
L.	Front Harness	Z.	Control Panel Harness (Black Wire)
M.	Ignition Switch	AA.	Battery Terminal (Pos.)
N.	Electric Screwjack		

WIRING SCHEMATIC MODELS ZF2200K & ZF2500K (Kohler Engines)

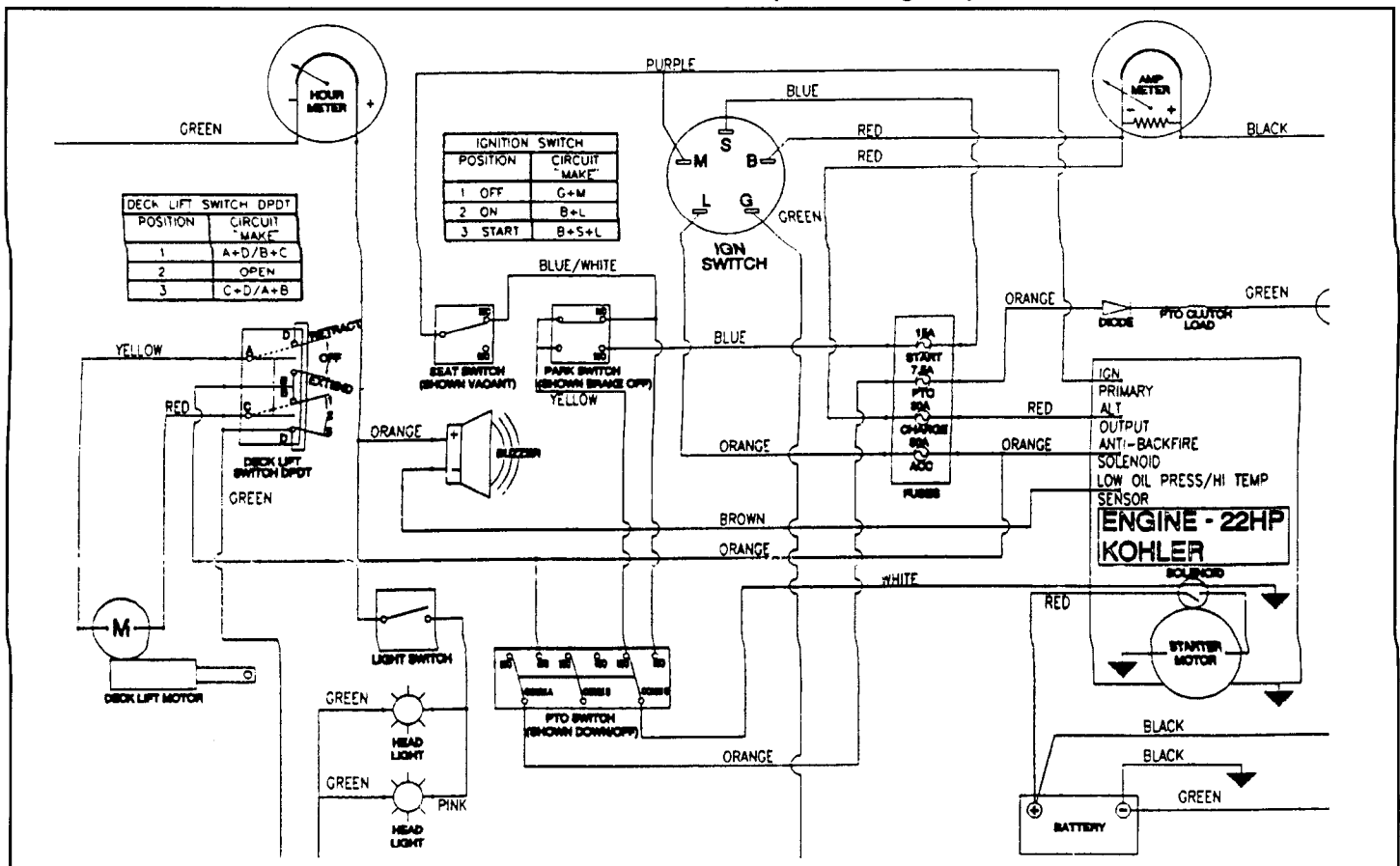


FIGURE 3.3

Section III - ELECTRICAL SYSTEM

WIRING SCHEMATIC

Model ZF2300GKU (Kubota Gasoline Engine)

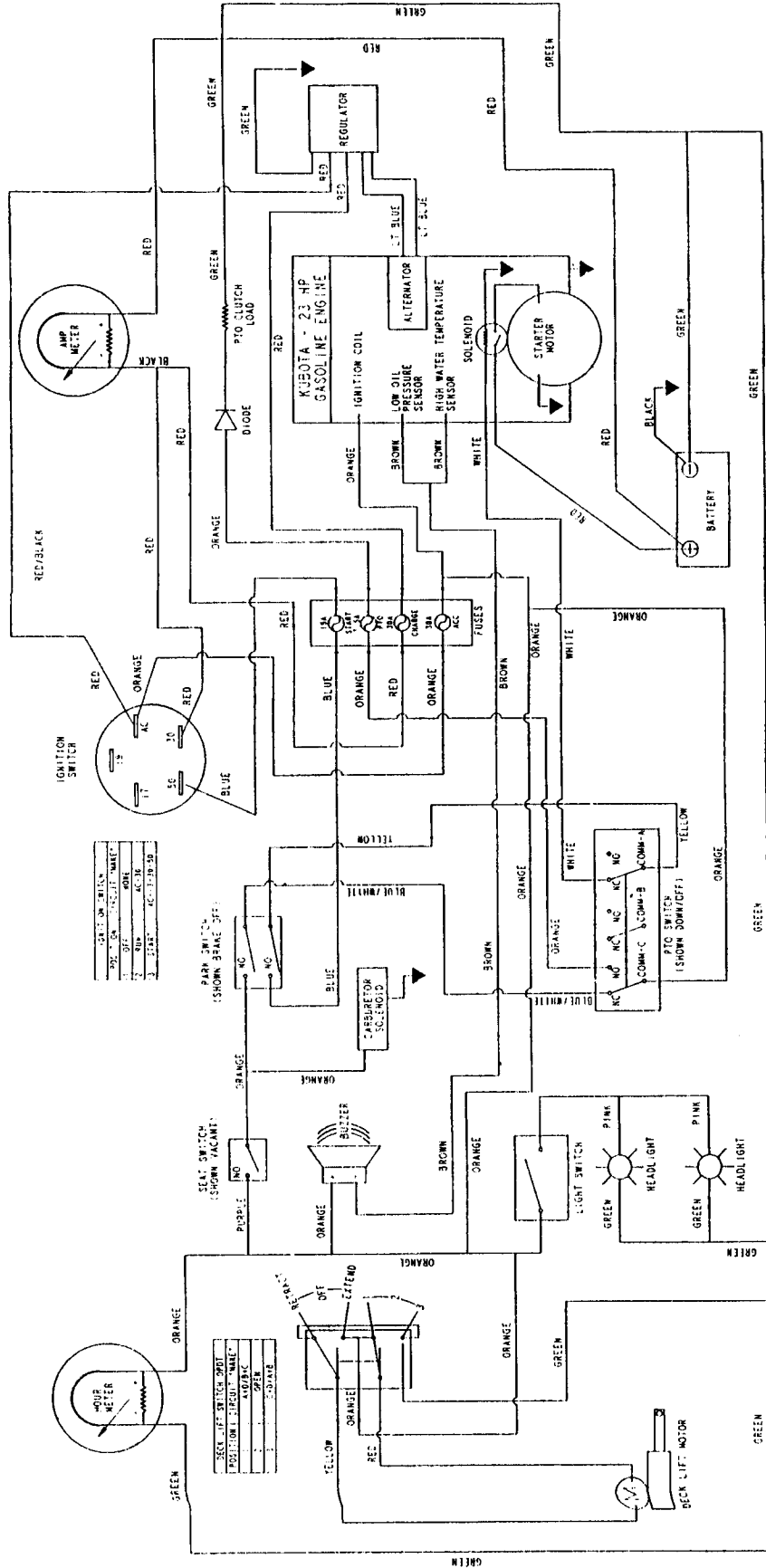


FIGURE 3.4

Section III - ELECTRICAL SYSTEM

WIRING SCHEMATIC

Models EZF2100DKU & ZF2100DKU (Kubota Diesel Engines)

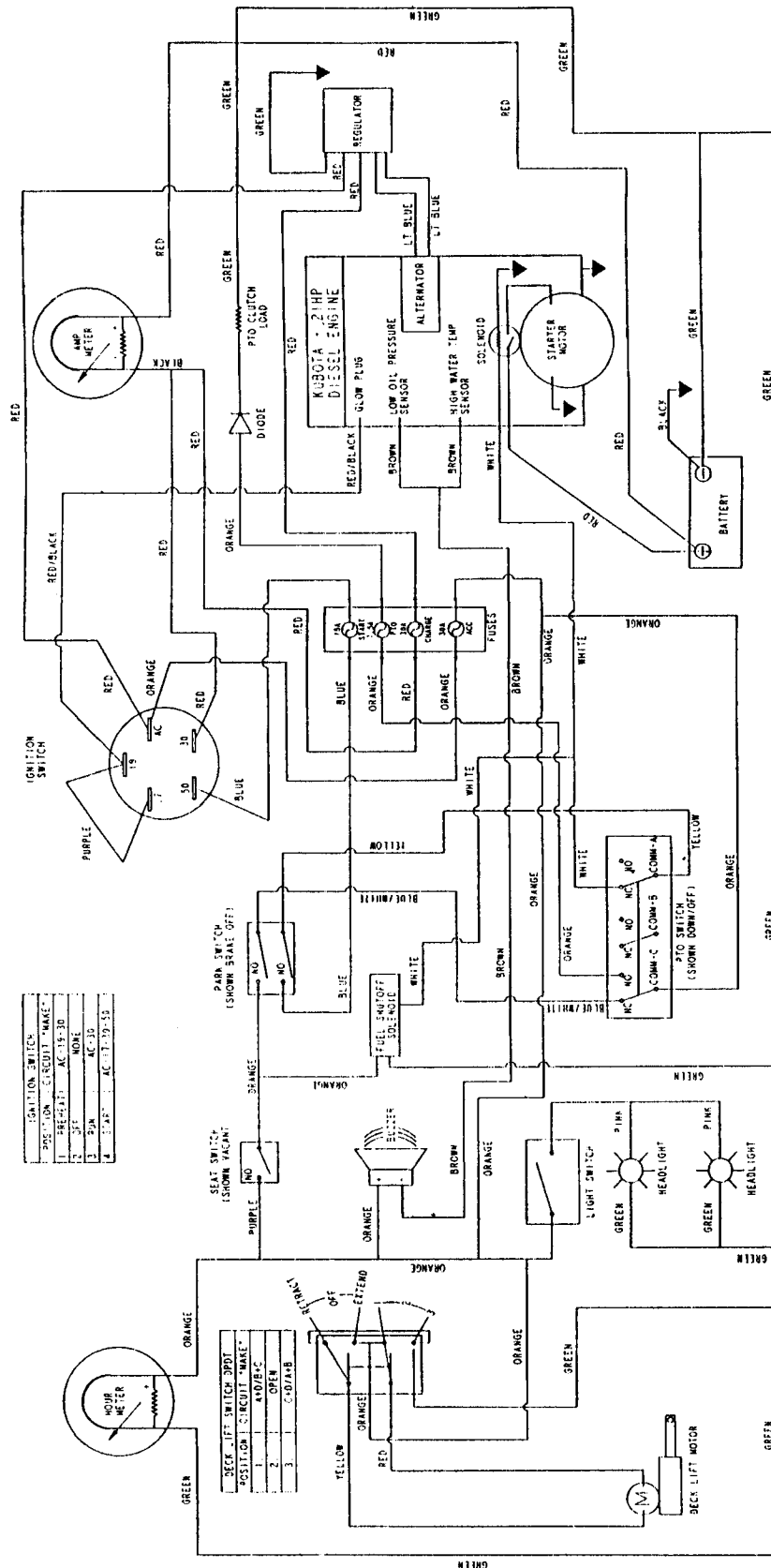


FIGURE 3.5

Section III - ELECTRICAL SYSTEM

3.3 BATTERY

A. BATTERY REMOVAL

1. Remove Battery Spring & Bracket.
2. Slide Terminal Cover away from Positive Terminal.
3. Observe and note Cable positions on Battery. See Figure 3.6.
4. Disconnect Cables from Battery Terminals, disconnecting BLACK (Negative) Cable first, then disconnect RED (Positive) Cable last. Retain Mounting Bolts and Nuts.

B. BATTERY INSTALLATION

1. Position Battery into Battery Compartment.
2. Connect Cables to Battery Terminals. Connect RED (Positive) Cable first. Connect BLACK (Negative) Cable last.
3. Reinstall Battery Bracket, Spring and Terminal Cover. Refer to Figure 3.6.

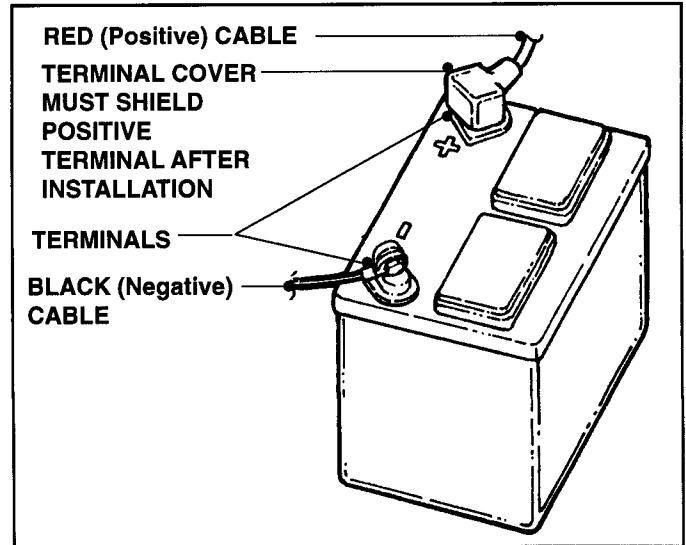


FIGURE 3.7



WARNING



Shield the Positive Terminal with Terminal Cover located on Battery Harness. This prevents metal from touching the Positive Terminal which could cause sparks. Cables must be connected to Battery Terminals in the proper position. RED (Positive) Cable must go to the (+) Terminal. Black (Negative) Cable must go to the (-) Terminal.

C. BATTERY SERVICE

1. Remove Battery.
2. Place Battery in a well-ventilated area on a level surface.
3. Using distilled water, refill Cells as required to cover Cell Plates.
4. With Cell Caps removed, connect Battery Charger to Battery Terminals. RED to Positive (+) Terminals and BLACK to Negative (-) Terminal. See Figure 3.7.

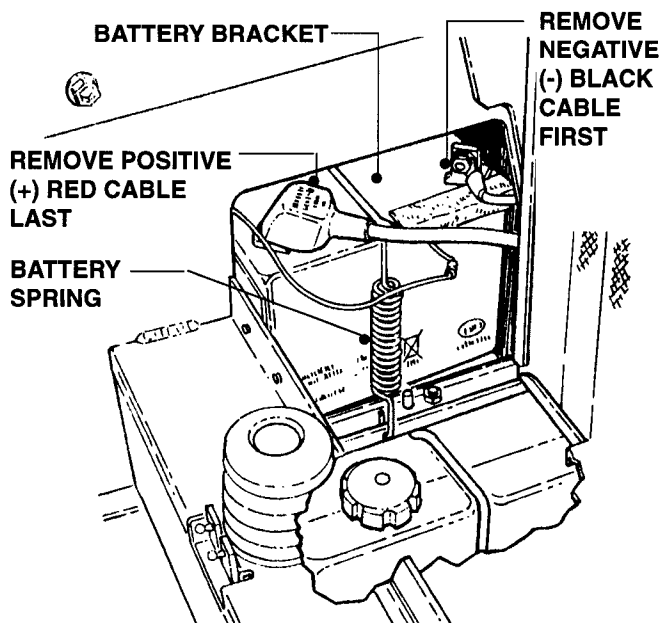


FIGURE 3.6

5. Slow charge Battery at 1 amp for 10 hours. An alternative fast charge should be no more than 2.5 amps for four hours.
6. If Battery will not accept charge, or is partially charged after 10 hours of charging at 1 amp, replace with new Battery. See "Battery Condition Chart" on following page.



WARNING



The electrolyte (acid) produces a highly explosive gas. Keep all sparks, flame and fire away from area when charging Battery or when handling electrolyte or Battery. Electrolyte (acid) is a highly corrosive liquid. Wear eye protection. Wash affected areas immediately after having eye or skin contact with electrolyte (acid). Battery acid is corrosive. Rinse empty acid containers with water and mutilate before discarding. If acid is spilled on Battery, bench or clothing, etc., flush with clear water and neutralize with baking soda.

D. BATTERY TESTING

There are two types of Battery Tests - Unloaded and Loaded. The Unloaded Test is the procedure that will be discussed. An Unloaded Test is made on a Battery without discharging current. To perform Unloaded Testing, check charge condition using either a hydrometer or voltmeter.

1. Using a voltmeter, voltage readings appear instantly to show the state of charge. Remember to hook the Positive Lead to the Battery's Positive Terminal, and the Negative Lead to the Negative Terminal.

(Continued on Following Page)

Section III - ELECTRICAL SYSTEM

BATTERY CONDITION CHART			
State of Charge	Syringe Hydrometer	Digital Voltmeter	Five Ball Hydrometer
100% Charged W/Sulfate Stop	1.280	12.80v	Five Balls Floating
100% Charged	1.265	12.60v	Four Balls Floating
75% Charged	1.210	12.40v	Three Balls Floating
50% Charged	1.160	12.10v	Two Balls Floating
25% Charged	1.120	11.90v	One Ball Floating
0% Charged	Less Than 1.100	Less Than 11.80v	Zero Balls Floating

2. A Hydrometer measures the specific gravity of each cell. The specific gravity tells the degree of charge, generally a specific gravity of about 1.265 to 1.280 indicates full charge. A reading of 1.230 to 1.260 indicates the Battery should be charged before testing. The charge above shows the charge level as measured by Syringe Float Hydrometer, Digital Voltmeter and Five Ball Hydrometer.

E. NEW BATTERY PREPARATION

1. Removed Battery from carton.
2. Place Battery in a well-ventilated area on a level non-concrete surface.
3. Remove Battery Cell Caps. Fill Cells as required with Electrolyte to proper level. Fill to 3/16" above Cell Plates. Filling Battery with Electrolyte will bring the Battery to 80% charged state.

6. After charging, check level of Electrolyte and add as needed to bring level to 3/16" above Cell Plates.
7. Reinstall Cell Caps.
8. Install Battery into Power Unit.
9. Connect Positive (+) Cable (RED) first, then Wiring Harness to the Positive Terminal (+) on Battery using bolt and nut provided. Connect Negative (-) Cable (BLACK) last, to Negative Terminal (-) on Battery using bolt and nut. Apply a small amount of grease over Terminals to prevent corrosion.

IMPORTANT!
3/16" above Cell Plates is the recommended level. However, do not try to measure this dimension. Never place anything in Battery other than specified Electrolyte.

WARNING
Shield the Positive Terminal with Terminal Cover located on Battery Harness. This prevents metal from touching the Positive Terminal which could cause sparks. Cables must be connected to Battery Terminals in the proper position. RED (Positive) Cable must go to the (+) Terminal. BLACK (Negative) Cable must go to the (-) Terminal.

WARNING
DO NOT OVERFILL!

4. With Cell Caps removed, connect Battery Charger to Battery Terminals; RED to Positive (+) and BLACK to Negative (-) Terminal.

WARNING
Never attempt to service or charge the Battery while it is installed in the machine. Never use "BOOST" chargers on the Battery.

5. Slow charge the Battery at 1 amp for 2 hours to bring the Battery to full charge.

Section III - ELECTRICAL SYSTEM

3.4 INTERLOCK SYSTEM ANALYSIS

A. KEY SWITCH TEST (DIESEL ENGINES)

1. Slide the Protective Rubber Boot away from the Switch Terminals.
2. Disconnect wires from the Switch Terminals. See Figure 3.8.
3. Hold the Switch in the PREHEAT Position and, using an Ohmmeter, connect Terminals AC and 19 - it should show continuity. Now, connect Terminals AC and 30 - there should be continuity.
4. Place the Switch in the OFF Position. There should be no continuity.
5. Hold the Switch in the START Position after connecting the Ohmmeter to Terminals AC and 17 - there should be continuity. Now, connect Terminals AC and 30 - there should be continuity. Terminals AC and 50 should show continuity, also.
6. Turn Key to RUN Position. Connect Ohmmeter to Terminals AC and 30. There should be continuity.
7. Reconnect Harness Wires to Switch Terminals after completing test. Replace Rubber Boot.

IGNITION SWITCH (DIESEL)	
POSITION	CIRCUIT "MAKE"
1. PREHEAT	AC - 19 - 30
2. OFF	NONE
3. RUN	AC - 30
4. START	AC - 17 - 30 - 50

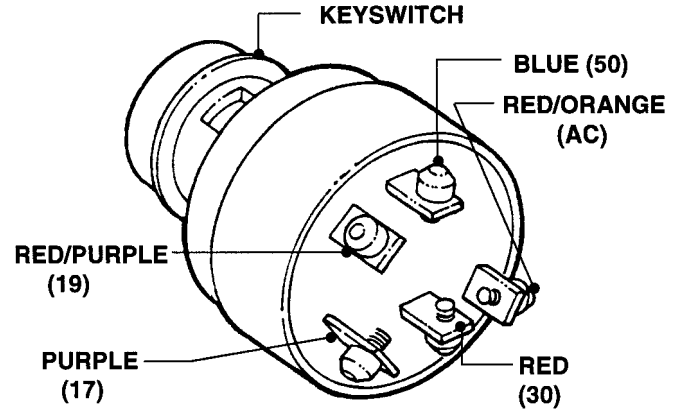


FIGURE 3.8

B. KEY SWITCH TEST (GAS ENGINES)

1. Slide the Protective Rubber Boot away from the Switch Terminals.
2. Disconnect Wires from the Switch Terminals. See Figure 3.9.
3. Place the Switch in the OFF Position. There should be no continuity.
4. Hold the Switch in the START Position after connecting the Ohmmeter to Terminals AC and 17 - there should be continuity. Now, connect Terminals AC and 30 - there should be continuity. Terminals AC and 50 should show continuity, also.
5. Reconnect Harness Wires to Switch Terminals after completing test. Replace Rubber Boot.

IGNITION SWITCH (GAS)	
POSITION	CIRCUIT "MAKE"
1. OFF	NONE
2. RUN	AC - 30
3. START	AC - 17 - 30 - 50

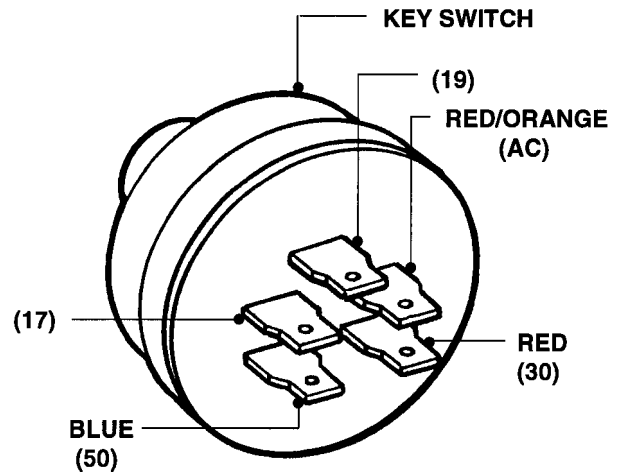


FIGURE 3.9

Section III - ELECTRICAL SYSTEM

C. PTO SWITCH TEST

1. Disconnect Wire Connectors from the Switch Terminals. See Figure 3.10.
2. Push Knob down to OFF position and connect Tester Leads to the Switch Terminals as follows:
 - a) #3 and #7
 - b) #6 and #7
 - c) #1 and #4the Light should NOT come on.
3. Pull Knob up to ON position and connect Tester Leads to the Switch Terminals as follows:
 - a) #1 and #4
 - b) #2 and #5
 - c) #3 and #6the Light SHOULD come on.

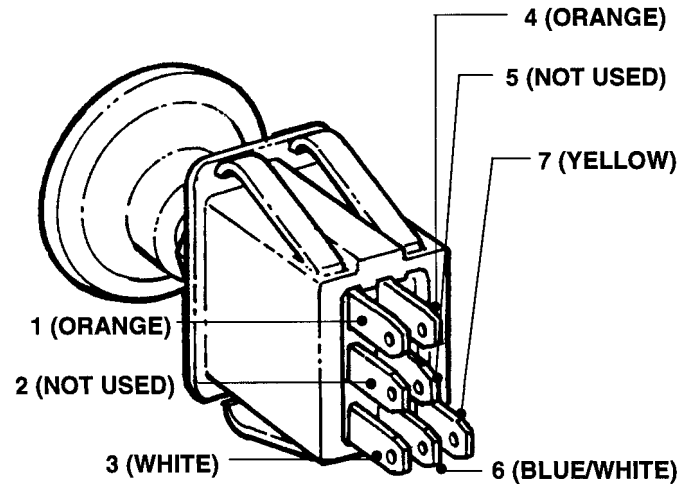


FIGURE 3.10

D. PARK BRAKE SWITCH TEST

1. Disconnect the Wires from the four Switch Terminals. See Figure 3.11.
2. Attach a Continuity Light to the two Terminals marked NC. Turn the Light Switch on - the bulb should light. Depress the Switch Button and the bulb should go out.
3. Next, attach the Light to the two UNMARKED Terminals. Turn the Light Switch ON and depress the Switch Button - the bulb should light ONLY when the Button is depressed.

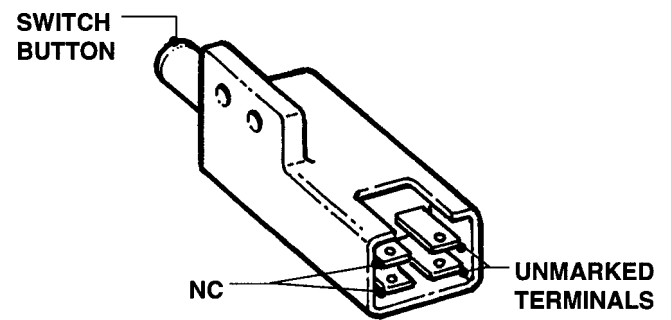


FIGURE 3.11

E. SEAT SWITCH TEST

1. Disconnect Seat Switch Plug from Seat Switch. See Figure 3.12.
2. Attach Continuity Light Wires to the Terminals.
3. Have a helper to depress the Seat Switch by pushing in on the Seat area directly above the Switch. When the Switch is depressed (making the circuit), the Light should come on.
4. Reconnect Wires to the proper Terminals.

IMPORTANT!

The Seat Switch Plug is equipped with a Grounding Plunger which will ground the Magneto unless fully depressed. Make certain you have a firm connection when attaching Plug to Seat Switch.

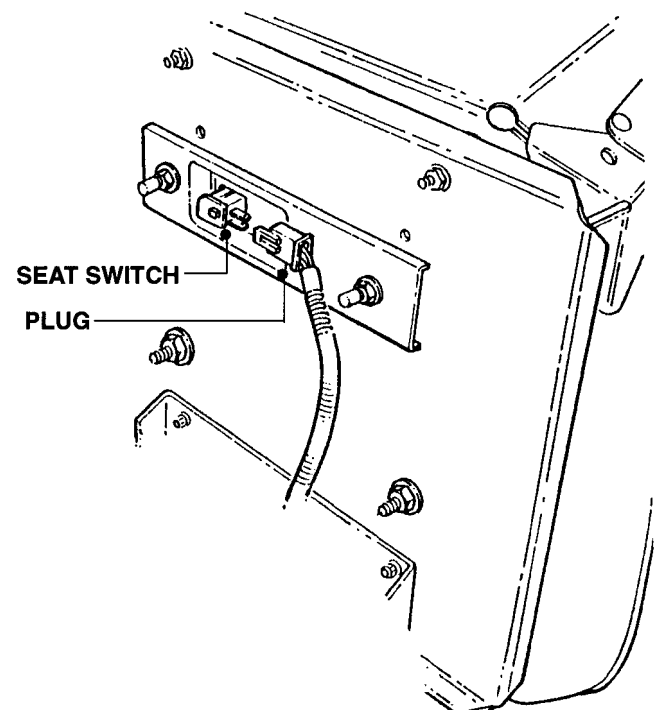


FIGURE 3.12

Section III - ELECTRICAL SYSTEM

3.5 DECK LIFT SWITCH TEST

- A. The self-centering Deck Lift Switch has three positions:
- Position 1 - UP
 - Position 2 - NEUTRAL (Self-Centering)
 - Position 3 - DOWN
- B. Test the Switch using an Ohmmeter as follows:
1. Disconnect wires from the Switch Terminals. See Figure 3.13.
 2. Push Switch to UP Position and, while holding in place, connect Terminals A and D - it should show continuity. Connect Terminals B and C - they also should show continuity.
 3. Release Switch, allowing it to assume the NEUTRAL Position. Test. There should be no continuity.
 4. Move Switch to DOWN Position and hold in place. Connect Terminals C and D - there should be continuity. Connect Terminals A and B - there should be continuity.

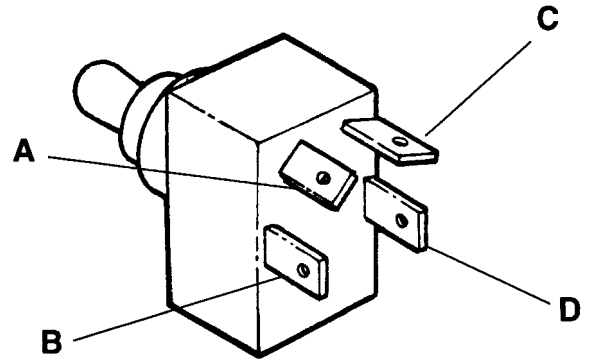


FIGURE 3.13

IMPORTANT



CAUTION



(Kubota Engines Only)

If the Chassis Ground Cable (Item No. 37, Figure 3.1) has been removed or loosened for any reason, make certain that it is properly attached and securely grounded to the lower chassis (frame) before starting Engine!

If this Cable is not properly grounded, the circuit will seek ground through the Engine. This circumstance can result in the burn-out of the Main Bearings in less than 40 hours of operation.

OEM ENGINE SERVICE MANUAL

KOHLER

COMMAND ENGINES - 18, 20, 22 & 25 HP Horizontal Crankshaft

Form No: TP - 2428A

Issue Date: 4/92

Revised: 4/94

Contact: Kohler Sales & Service 1-800-544-2444

Section IV ENGINE & FUEL SYSTEM

(Kohler 22 & 25 HP ENGINES)

CONTENTS

<u>ITEM</u>	<u>PAGE No.</u>
Introduction	4.2
Engine Maintenance	4.2
Engine Removal	4.3 - 4.4
Engine Part Numbers	4.4
Engine Installation	4.4 - 4.5
Flexible Disc Removal	4.5
Flexible Disc Replacement	4.5 - 4.6
Fuel System	4.7
Main Fuel Tank Replacement	4.7
Notes	4.8

Section IV - ENGINE & FUEL SYSTEM

INTRODUCTION

This Section covers only those SNAPPER OUT FRONT Z-RIDERS powered by Kohler Twin Cylinder, Air-Cooled, 22 and 25 HP Gasoline Engines. See Section V for information covering service of Kubota gasoline and diesel engines.

The following information covers the maintenance, removal and installation of these engines. Refer to the Manufacturer's Service/Repair Manuals for information covering Engine Repair.

4.1 ENGINE MAINTENANCE (KOHLER)

A. ENGINE OIL

1. Change Engine Oil on a regular schedule. Use only those oils classified for Service SF, SE, SD or SC. These oils will keep the engine cleaner and will help retard the formation of gum and varnish deposits. **DO NOT** use oil additives!
2. Refer to the following chart for recommended grades to use with temperature range anticipated before next oil change.

RECOMMENDED SAE VISCOSITY GRADES

					30				
			10W-30						
	5W-20, 5W-30	*							
*F	-20	0	20	40	60	80	100		
*C	-30	-20	-10	0	10	20	30	40	
Temperature Range Anticipated Before Next Oil Change									

* If not available, a synthetic oil may be used having 5W-20 or 5W-30 viscosity.

B. SPARK PLUGS

1. Spark Plugs should be cleaned or replaced (if necessary) and gap reset to .040 (1.02mm) every 100 hours of operation or every 6 months, whichever comes first.
2. To clean, remove Spark Plug from Engine, scrape or wire brush and wash with a commercial solvent. **DO NOT** blast clean.

NOTE

Sparking can occur if Wire Terminal does not fit firmly on Spark Plug. Compress Terminals if necessary.

C. MUFFLER

1. When servicing Engine, inspect Muffler for signs of damage or deterioration. Replace as required.
2. Make sure that Muffler Guard (if applicable) is always in place and secure before allowing mower to leave shop.



CAUTION



Worn out Mufflers are more than just a noise nuisance and should be replaced immediately. Continued use could result in fire or explosion!

D. AIR CLEANER

(Consult Engine Manual for Part Number of Filter Element).

1. Inspect Filter during every Engine Service or every 25 operating hours (more often if mower is used under extremely dirty or dusty conditions). See Figure 4.1.

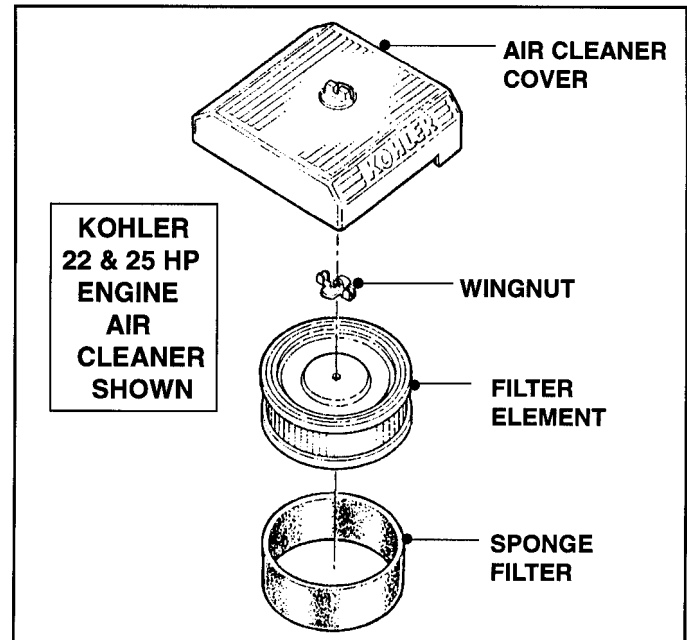


FIGURE 4.1

1. Clean Sponge Filter per Manufacturer's instructions.
2. Replace Filter Element as required.
3. Always clean Cover inside and out, and clean Base before reassembly.

E. FUEL FILTER



WARNING



Gasoline is flammable and must be handled with care. **DO NOT** allow open flame, matches or smoking in area. Wipe up any spills. Use approved (RED) fuel container.

1. Both the 22 and 25 HP Kohler Engines use a 15 Micron Inline Fuel Filter which is initially furnished as an OEM Item. Replacement filters are SNAPPER Part No. 4-4777.
2. Check the Inline Fuel Filter at frequent intervals and replace before it becomes clogged with sediment.
3. Make certain that the replacement filter is correctly installed with the gas flow going to the Engine.
4. Check other Fuel System Components frequently and replace any parts that are worn or cracked.

Section IV - ENGINE & FUEL SYSTEM

4.2 ENGINE REMOVAL (KOHLER)

- A. Disconnect the Battery. Remove NEGATIVE (-) BLACK Cable first and POSITIVE (+) RED Cable last. Secure Cables away from the Battery. See Figure 4.2.

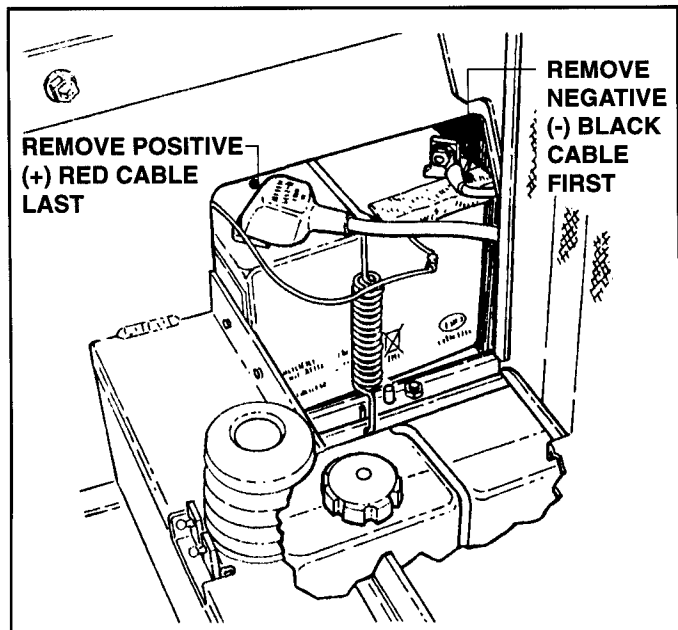


FIGURE 4.2

- B. Disconnect Engine Pigtail from Wiring Harness. See Figure 4.3.

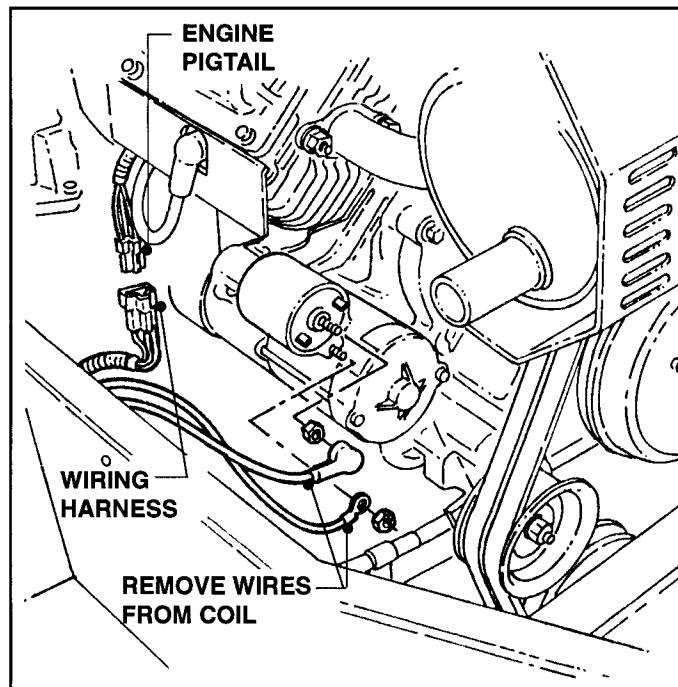


FIGURE 4.3

- C. Remove Wires from Coil. Refer to Figure 4.3.
- D. Disconnect Electric Clutch Pigtail from Wiring Harness and remove Fasteners from Cable Clamps. See Figure 4.4.

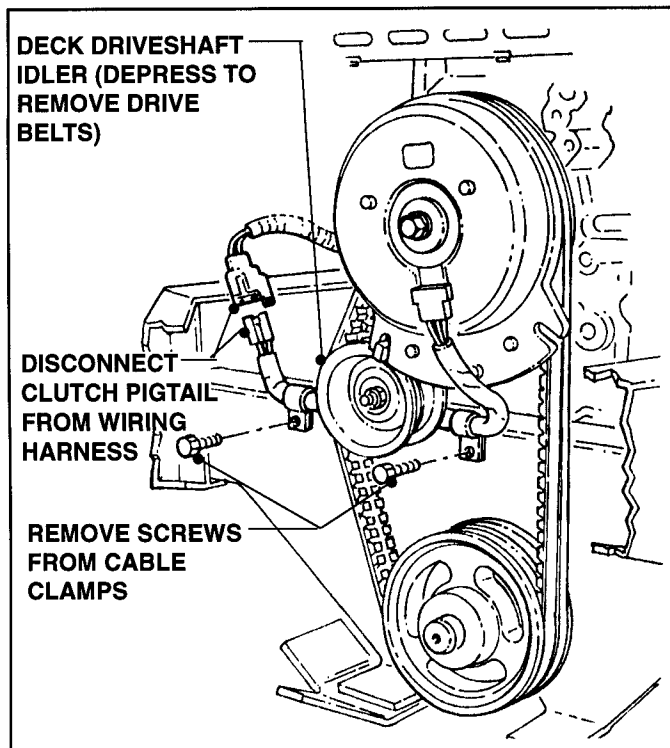


FIGURE 4.4

- E. Depress Deck Driveshaft Idler and remove Drive Belts. Refer to Figure 4.4.
- F. Squeeze Fuel Line Clamp and remove Fuel Line from Engine. Plug open end of Line. See Figure 4.5.

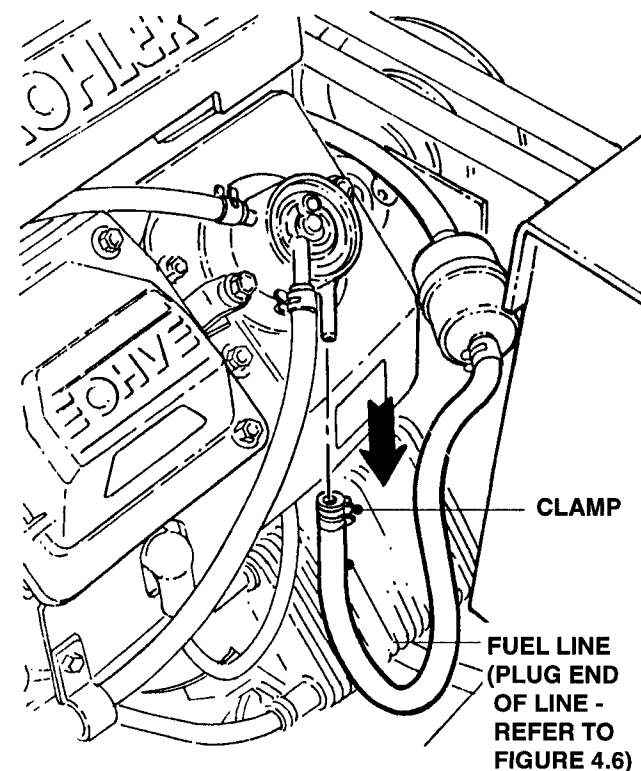


FIGURE 4.5

Section IV - ENGINE & FUEL SYSTEM

- G. Separate Left Main Fuel Line from front of Engine by bending Hose Clamps away from Line. See Figure 4.6.

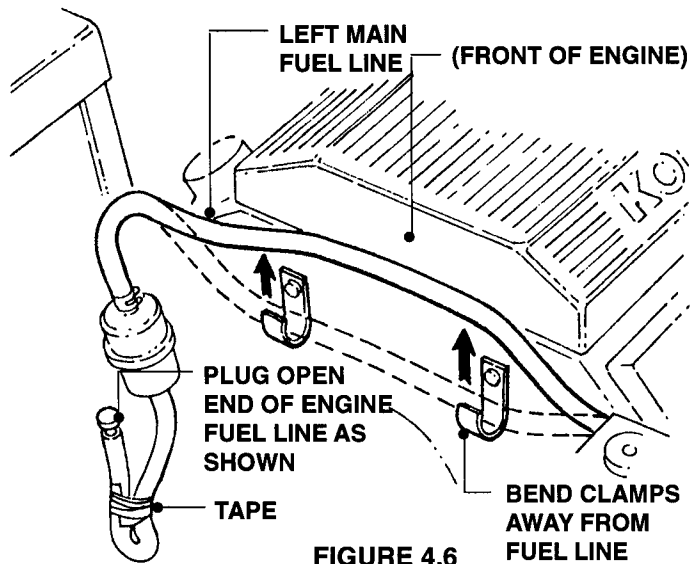


FIGURE 4.6

- H. Disconnect Choke and Throttle Cables from Engine. Store both Cables out of the way.
 J. Separate Upper Drive Shaft from Engine as follows:
 1. Loosen the two (2) Sq. Hd. Set Screws. See Figure 4.7.

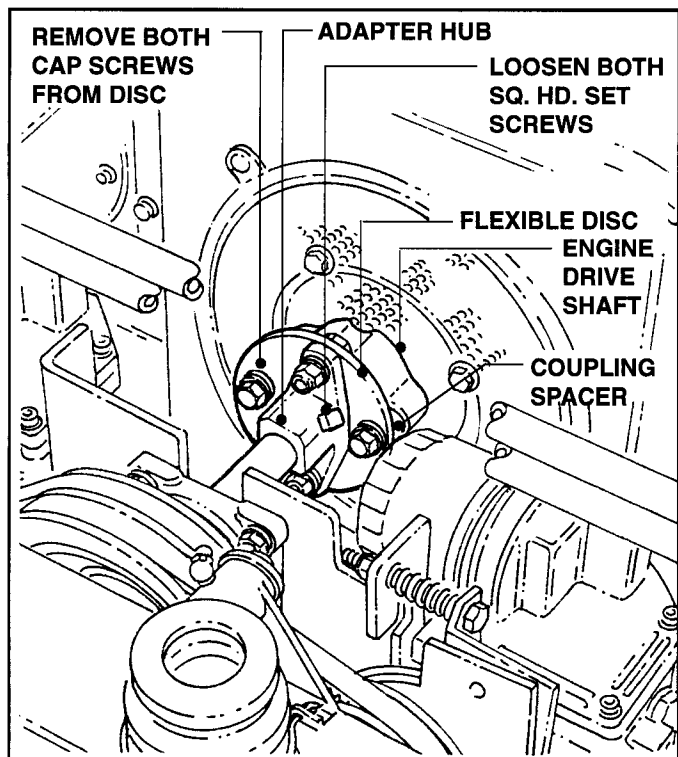


FIGURE 4.7

2. Remove the two (2) Hex Hd. Cap Screws, Lock Washers and Flat Washers which secure the Flexible Disc to the Engine Driveshaft.

3. Slide Adapter Hub/Flexible Disc Assembly away from Engine. Place Coupling Spacers and Washers aside for reassembly. Refer to Figure 4.7.

NOTE

At this point of disassembly, check Flexible Disc for damage. If replacement is required, see Step 4.5 "FLEXIBLE DISC REMOVAL".

- K. Remove the four (4) Engine Mounting Nuts and Hex Hd. Capscrews. Store Ground Wire out of the way. See Figure 4.8.

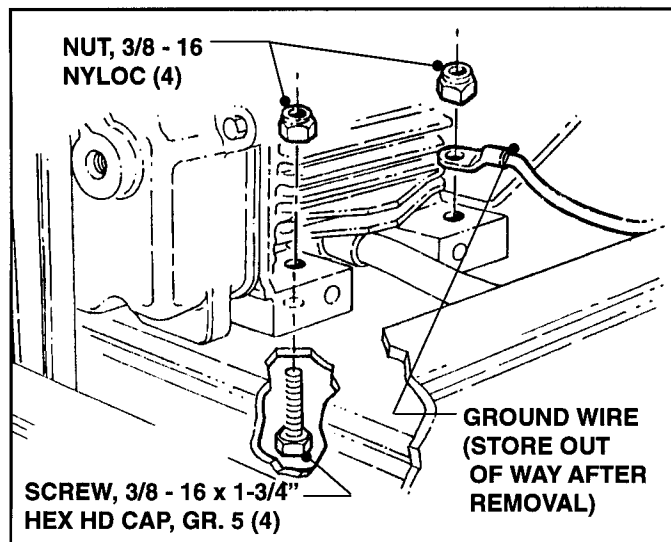


FIGURE 4.8

- L. Attach suitable lifting device to lift Ears on Engine. Remove Engine from Frame.

NOTE

In order to accommodate certain lifting devices, it may be necessary to remove Air Filter before attaching lift to Engine.

4.3 ENGINE PART NUMBERS

- A. Engine, 22 HP (Kohler No. CH22S PS-66536)
 B. Engine, 25 HP (Kohler No. CH25S PS-68577)
 (Refer to SNAPPER Parts Manual No. 06106 (REV. 2, 11/97) for Parts Numbers of Engine Components).

4.4 ENGINE INSTALLATION

- A. If installing a new or replacement Engine, the Engine should be fitted with all usable components taken from the one removed.
 B. Install a new Fuel Filter (KOHLER Part No. 4-4777) and inspect Fuel Lines for damage. Replace as required.

(Continued on Following Page)

Section IV - ENGINE & FUEL SYSTEM

- C. Install a new Filter Element in the Air Cleaner.
- D. Install new Oil Filter.
- E. Reinstall Engine to Frame in reverse order of removal.

4.5 FLEXIBLE DISC REMOVAL

- A. Loosen both Set Screws on the Adapter Hub. See Figure 4.9.

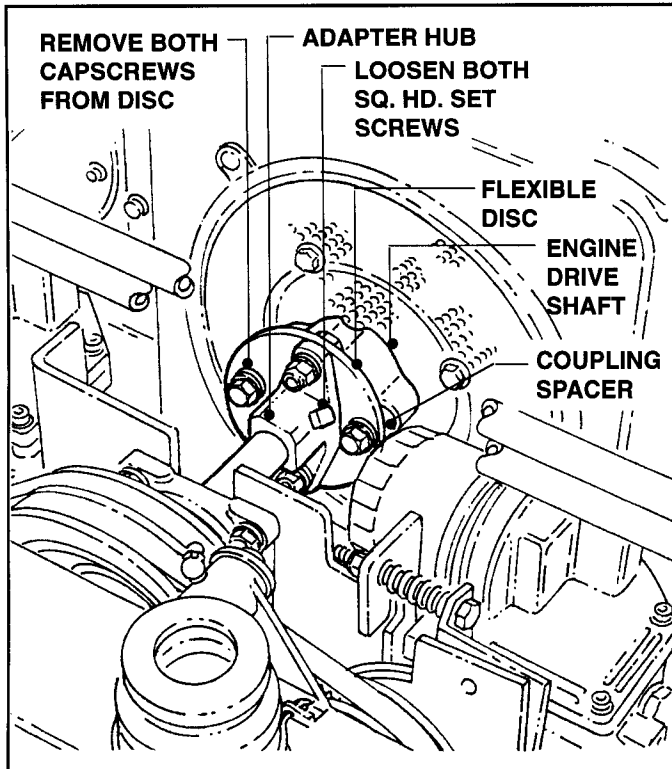


FIGURE 4.9

- B. Remove the two (2) Hex Hd. Cap Screws, Lock Washers and Flat Washers which secure the Flexible Disc to the Engine Driveshaft.
- C. Slide Adapter Hub/Flexible Disc Assembly away from Engine. Place Coupling Spacers and Washers aside for reassembly. Refer to Figure 4.10.

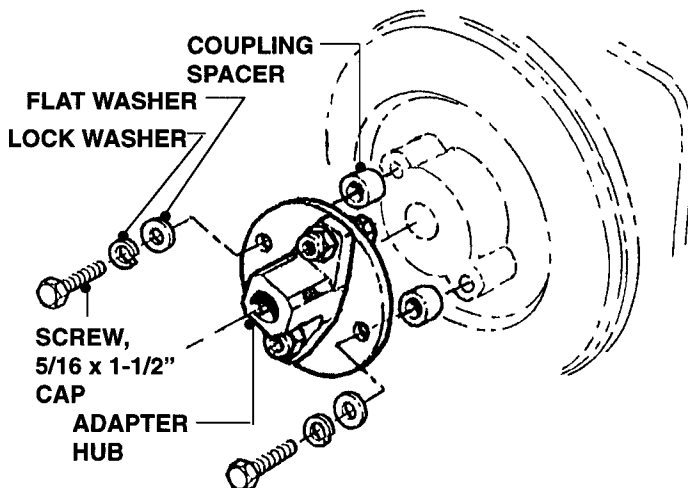


FIGURE 4.10

NOTE

At this point of disassembly, check Flexible Disc for damage. If replacement is required, see Step 4.6 "FLEXIBLE DISC REPLACEMENT".

4.6 FLEXIBLE DISC REPLACEMENT

- A. Loosely attach NEW Flexible Disc to Engine Drive Shaft with two (2) Coupling Spacers, 5/16 x 1-1/2" Hex Hd. Cap Screws, Lock Washers and Flat Washers. Refer to Figures 4.9 and 4.10.
- B. Remove Adapter Hub from the old Flexible Disc and loosely attach it to the NEW Disc as shown in Figure 4.11.

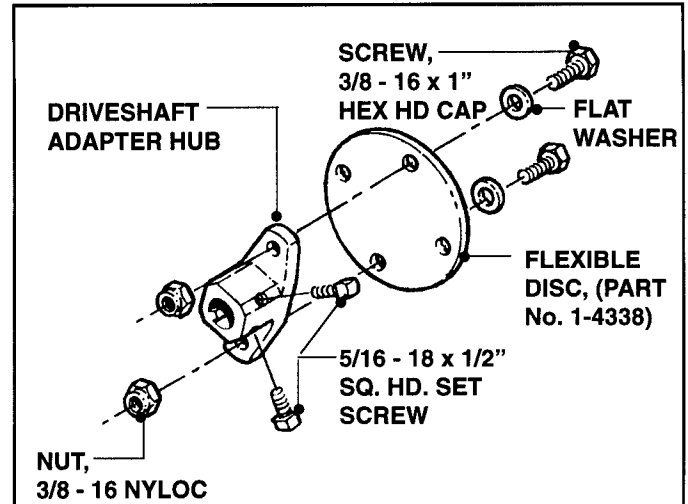


FIGURE 4.11

NOTE

At this point - for Drive Alignment Purposes - perform the following steps.

1. Loosen Set Screws on Flange Bearing Lock Collar. See Figure 4.12, Pg. 4.6.
2. Loosen the three (3) 5/16 - 18 Hex Nyloc Flange Bearing Mounting Nuts until Bearing will move freely.
3. Loosen the two (2) 5/16 - 18 x 5/8" Skt. Hd. Set Screws on the Dual V-Drive Pulley.

- C. Slide Upper Drive Shaft into Adapter Hub. Secure loosely with the two (2) Sq. Hd. Set Screws found on the Hub.
- D. Align Dual V- Drive Pulley with both Transaxle Fan (Input) Pulleys.
- E. Install both V-Belts. Make any necessary alignment adjustments at this time.
- F. Tighten Flexible Disc to Engine Drive Shaft.
- G. Tighten Adapter Hub to Flexible Disc.

(Continued on Following Page)

Section IV - ENGINE & FUEL SYSTEM

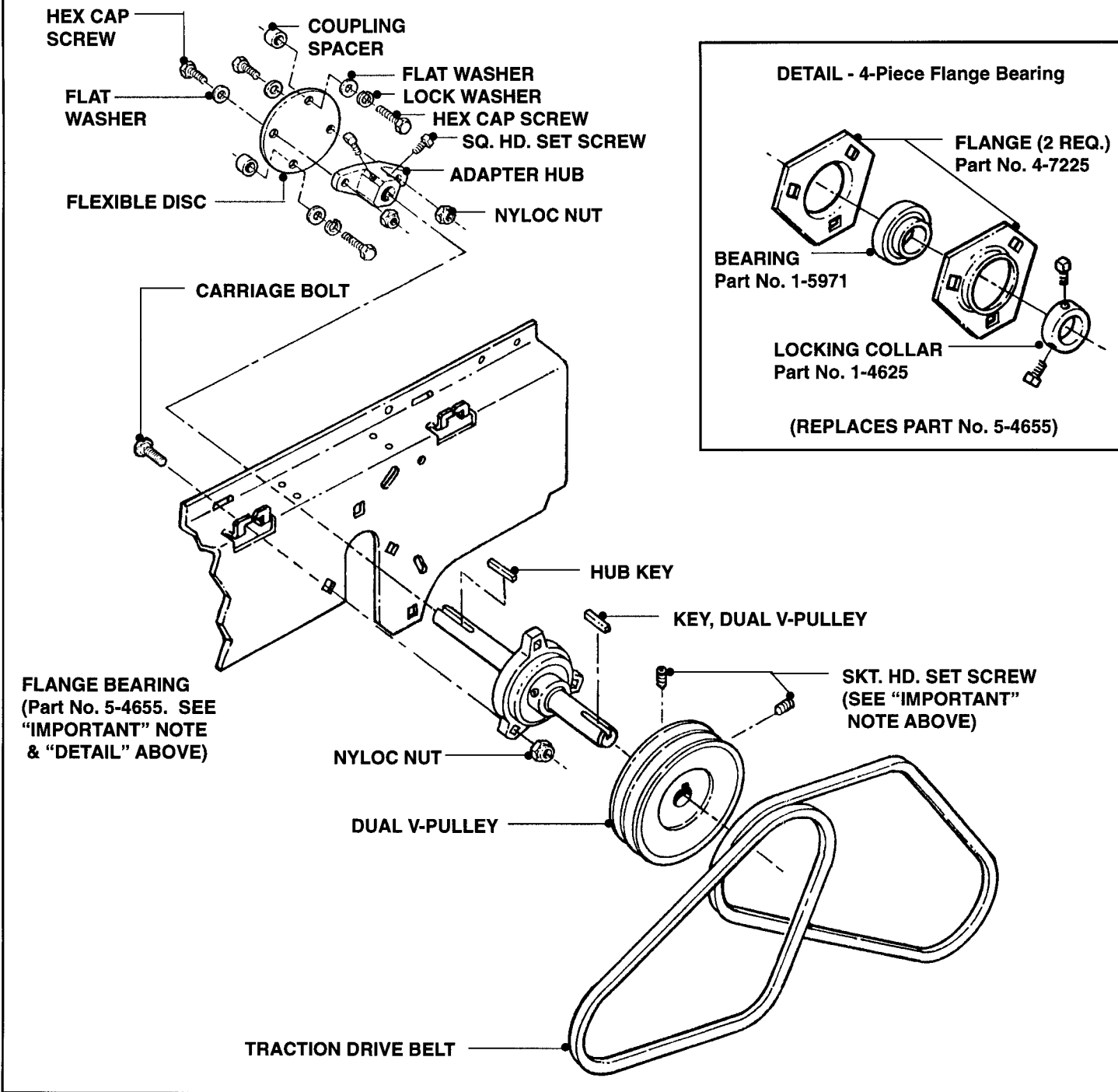
- H. Tighten the two (2) Sq. Hd. Set Screws on the Adapter Hub. (This will secure the Upper Drive Shaft to its Drive Axis).
- J. Tighten the Flange Bearing Mounting Nuts.
- K. Tighten the two (2) Skt. Hd. Set Screws on the Dual V-Drive Pulley.

IMPORTANT!
 Early production units of the OFZ used Socket Head Set Screws to secure the Driven and Drive Pulleys. These should be replaced with Square Head Set Screws (consult Parts Man. No. 06106 (REV. 2, 11/97)).

Also, the one-piece Flange Bearing shown below, Part No. 5-4655, should be replaced with the 4-piece Flange Bearing. See "Detail" below.

NOTE
 Check Belt Alignment again. If necessary, make required adjustments until both Belts run true in the Pulleys.

UPPER DRIVESHAFT ASSEMBLY



Section IV - ENGINE & FUEL SYSTEM

4.7 FUEL SYSTEM

The Fuel System of the SNAPPER OUT FRONT Z-RIDERS consist of a Fuel Tank, Fuel Filter, Hoses, Clamps and Fuel Tank Support Bracket - all of which mount to the Upper Chassis. Components of the Fuel System are shown in Figure 4.13.

IMPORTANT!

The Fuel System should be inspected at each service period. Check for cracks or leaks in the Tank(s); Valve leakage and Fuel Hose integrity. Replace any item that appears worn or is damaged. Replace Fuel Filter on a regular basis.

4.8 FUEL TANK REPLACEMENT

- A. Remove L.H. Fender as an assembly (refer to Section VII, "L.H. FENDER REMOVAL").
- B. Remove the Hose Clamp and Fuel Hose from the Tank Fuel Outlet.
- C. Lift and remove Tank from the Tank Support Bracket.
- D. Install new Tank in reverse order of removal.

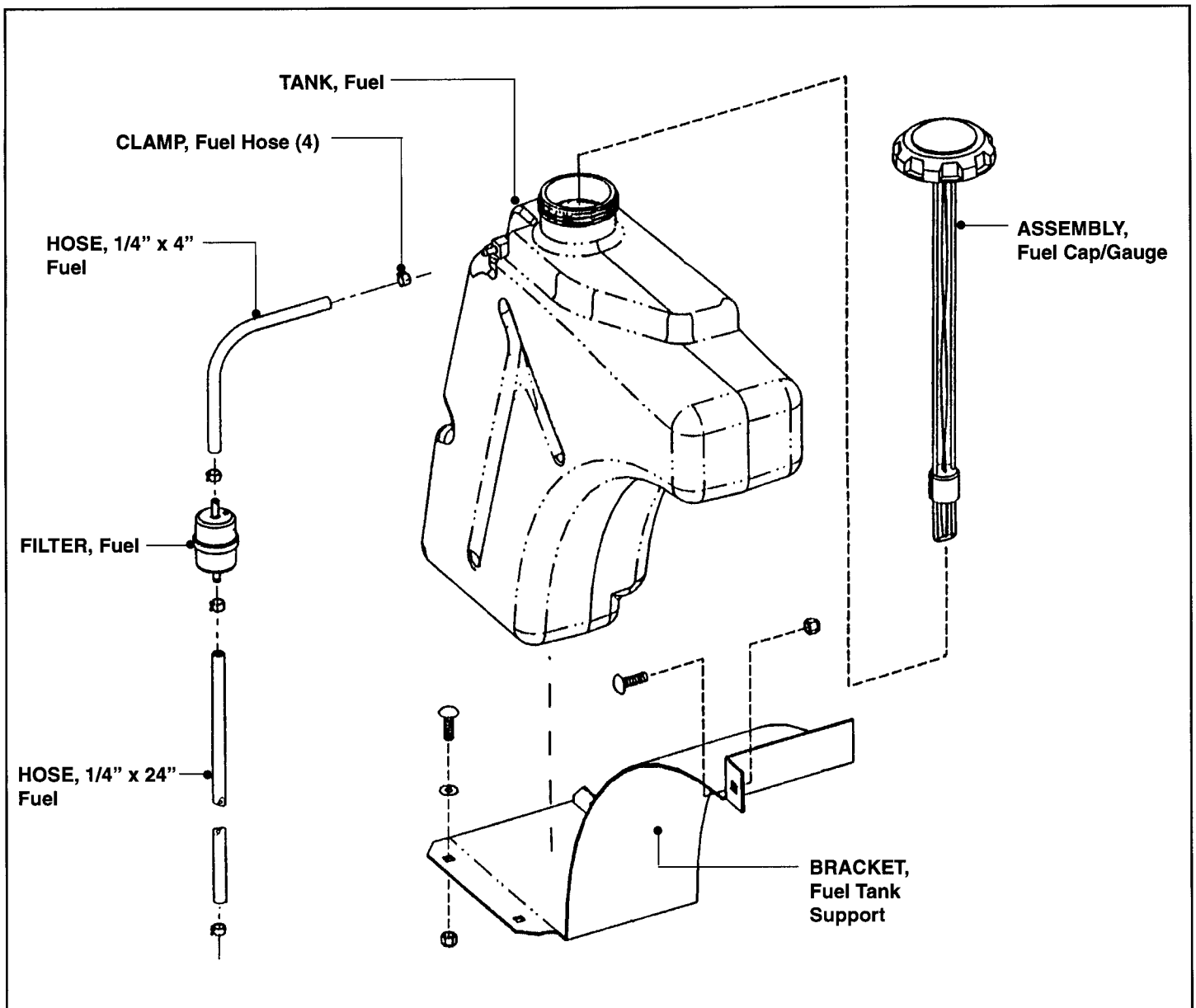


FIGURE 4.13

OEM ENGINE SERVICE MANUALS

Kubota

DIESEL ENGINE - 22 HP WATER-COOLED

Title: WORKSHOP MANUAL, DIESEL ENGINE - 68mm STROKE SERIES

Contains: 68mm STROKE SERIES - WSM, 01160 - WSM, 01161 - WSM, 01162

Contact: Kubota Factory Representative (See Yellow Pages)

GASOLINE ENGINE - 23 HP WATER-COOLED OHV

Title: WORKSHOP MANUAL, GASOLINE ENGINE - WG750 - B

Contains: W6750 - B - WSM, 00641 - WSM, 60203 - 0

Contact: Kubota Factory Representative (See Yellow Pages)

Section V

ENGINE & FUEL SYSTEM

(Kubota 22 HP Diesel & 23 HP Gasoline Engines)

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Section V - ENGINE & FUEL SYSTEM

5.1 ENGINE MAINTENANCE (KUBOTA 22 HP DIESEL ENGINE)

A. ENGINE OIL

1. Change Engine Oil on a regular schedule.

NOTE

Use only those oils classified for API Service CC or CD which are suitable for the temperature range anticipated before next oil change.

Above 77° F (25° C).....SAE 30 or 10W-30
32° F to 77° (0° to 25° C)...SAE 20 or 10W-30
Below 32° F (0° C).....SAE 10W or 10W-30

Oil Capacity of the Kubota 22 HP Diesel Engine is 4 U.S. qts. (3.2 Liters/2.81 Imp. qts.).

2. Change Oil Filter after first 50 hours of operation and at each oil change thereafter. See Figure 5.1.

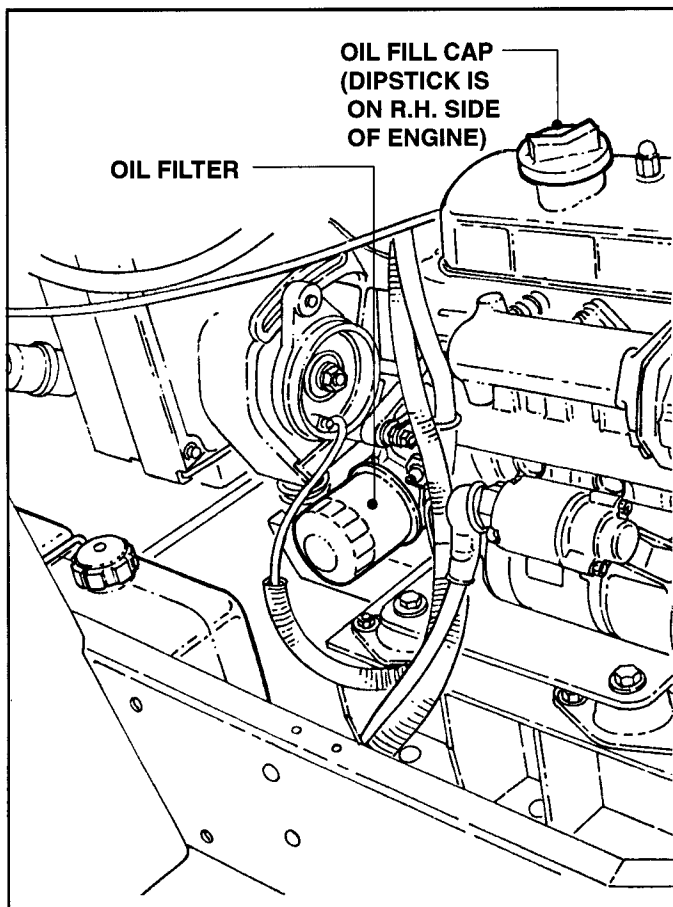


FIGURE 5.1

B. CLEANING/REPLACING FUEL FILTER

Engine must be cold before removing Fuel Filter. Proceed as follows:

1. Close Fuel Filter Cock. See Figure 5.2.
2. Remove Fuel Bowl Retaining Ring.

3. Remove Fuel Bowl. Clean Bowl thoroughly with kerosene.
4. Remove Filter element, large and small O-rings and Spring.
5. Submerge Filter Element in kerosene and move it about vigorously to rinse away debris. Remove Filter from kerosene and stand it on a clean cloth.
6. Reassemble Fuel Filter in reverse order.

NOTE

Replace Fuel Filter if it cannot be properly cleaned.

7. Bleed the Fuel System (C. BLEEDING FUEL SYSTEM).

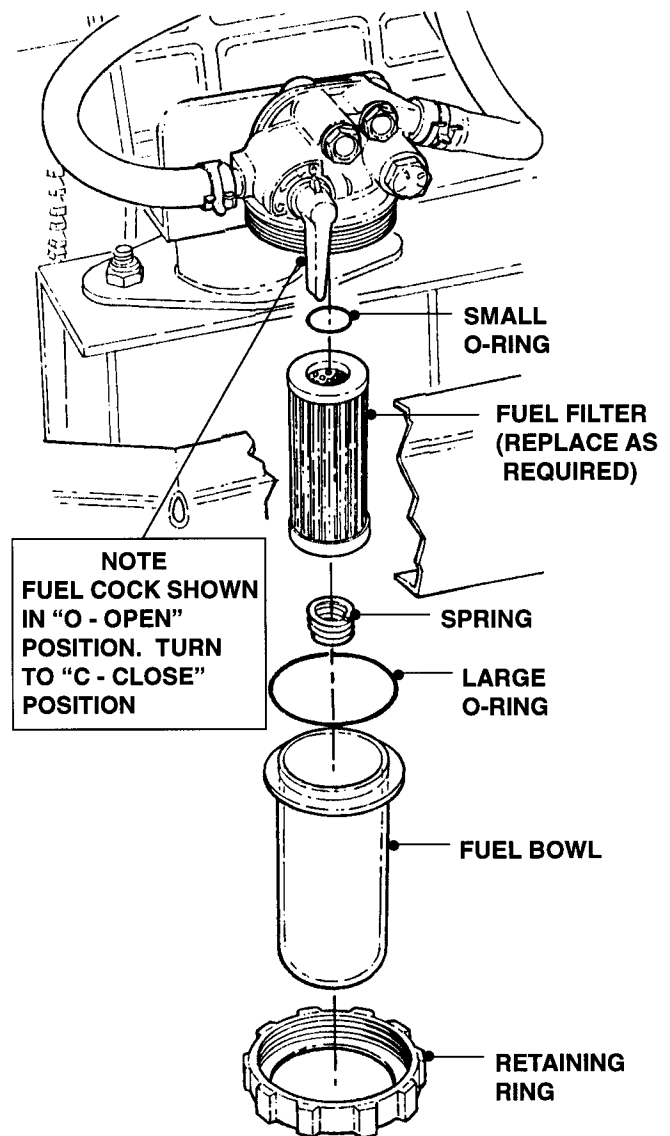


FIGURE 5.2

Section V - ENGINE & FUEL SYSTEM

C. BLEEDING FUEL SYSTEM

1. Make sure that Fuel Filter Cock is closed.
2. Remove Fuel Cap and fill Fuel Tank to the fullest extent. Replace Fuel Cap.
3. Open Fuel Filter Cock. See Figure 5.3.
4. Loosen the Air Vent Plug a few turns. Allow air bubbles to be released. Close Air Vent Plug when a steady flow of fuel appears.

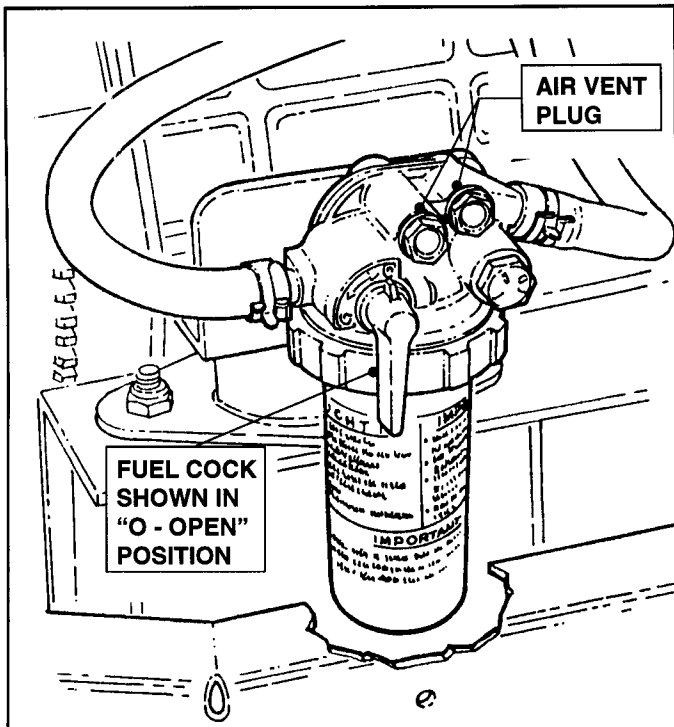


FIGURE 5.3

5. Loosen the Air Vent Plug on top of the Fuel Injection Pump. See Figure 5.4.

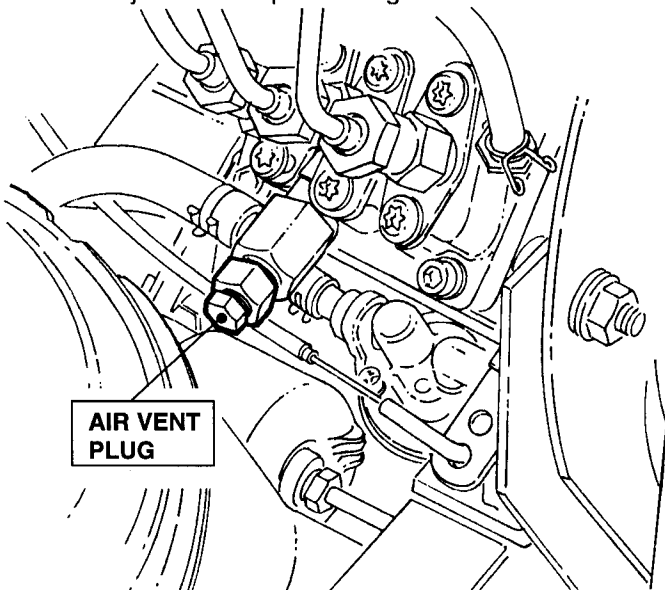


FIGURE 5.4

6. Allow air bubbles to be released. Retighten Plug when bubbles stop. Refer to Figure 5.4.

NOTE

Keep Air Vent Plug on Fuel Injection Pump tight except when bleeding Fuel System. Otherwise, Engine may not operate.

D. CHECK FUEL LINES/CONNECTIONS

1. Check all Fuel Lines for any cuts, breaks or other damage. Replace as required.
2. Check Clamped connections for air or fuel leaks. Replace Clamps or Fuel Hose as required.
3. Check Fuel Tank and Fuel Cap for leaks. Replace items as required.

E. AIR CLEANER SERVICE

The Air Cleaner should be disassembled, thoroughly cleaned and fitted with a new (or cleaned) Air Filter Element at least once a year - more often under extremely dry or dusty conditions. The Air Filter Element is cleaned as follows:

1. Remove Filter Cannister Cover. See Figure 5.5.
(Continued on Page 5.4).

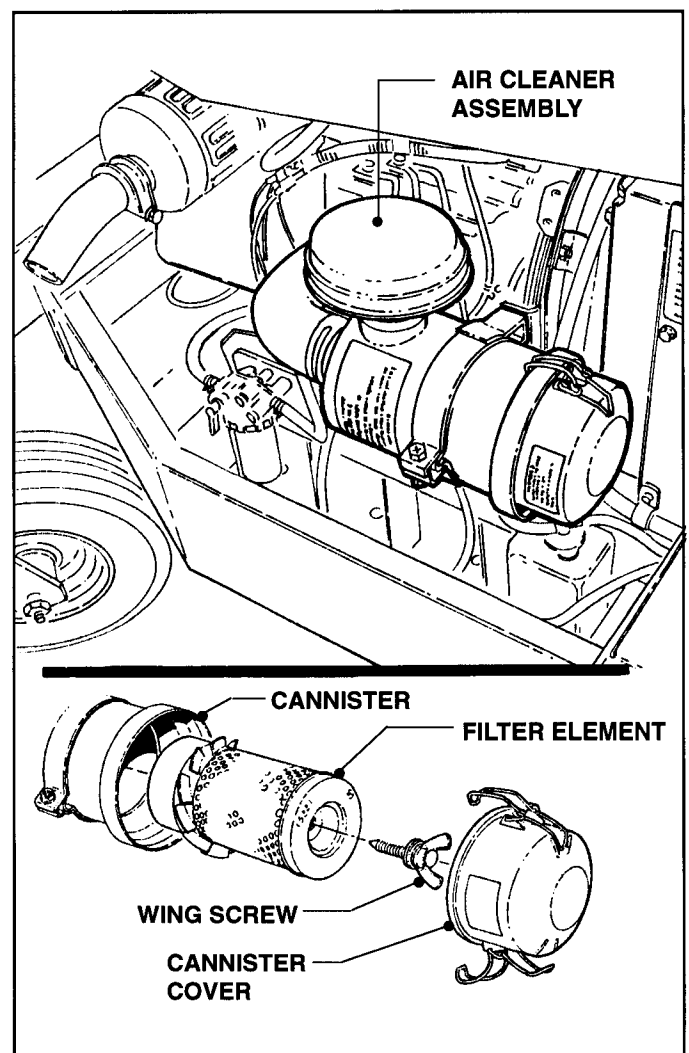


FIGURE 5.5

Section V - ENGINE & FUEL SYSTEM

(Continued from Page 5.3)

2. Remove Wing Screw and Filter Element (refer to Figure 5.5).
3. Place Filter Element on flat surface, finned-end down, and direct compressed air into the inside of the Element. Do not let the Air Nozzle get against the Filter.

NOTE

Nozzle Air Pressure must not exceed 100 PSI.

4. After cleaning or replacing Filter Element, re-assemble the Air Cleaner Assembly.

F. CHECKING FAN BELT TENSION

1. Apply a force of 22 lbs. (30.4 N•m, 10 kgf.) to the center of the Fan Belt between the Fan Pulley and the Alternator Pulley.
2. Belt deflection at this point should be 0.78 inches (10mm).
3. To adjust Fan Belt tension, loosen Tensioning Screw at top of Alternator. See Figure 5.6. Move Alternator "IN" or "OUT" until Belt tension is correct. Retighten Tensioning Screws.

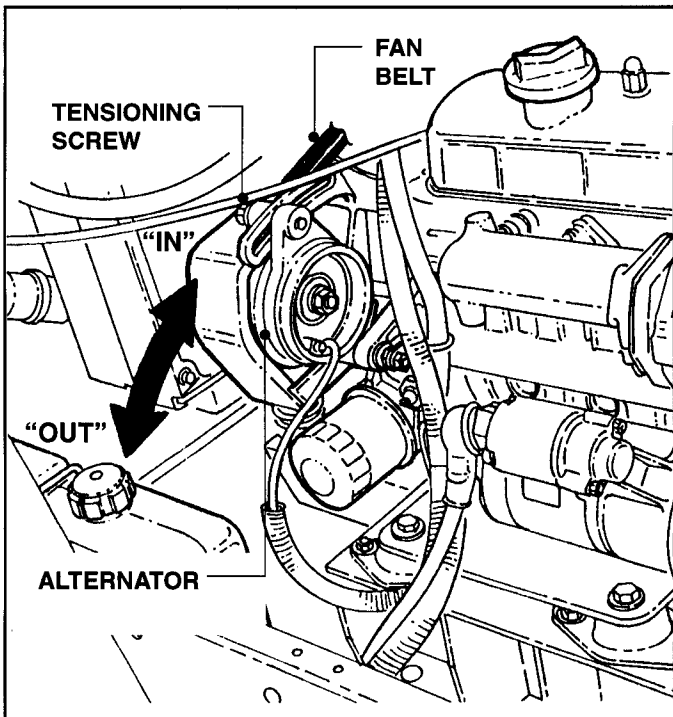


FIGURE 5.6

NOTE

If replacement of Fan Belt is required, see "FAN BELT REMOVAL/REPLACEMENT" on Page 5.8.

G. MUFFLER

1. When servicing Engine, inspect Muffler for signs of damage or deterioration. Replace as required.
2. Make sure that Muffler Guard (if applicable) is always in place and secure before allowing mower to leave shop.



CAUTION



Worn out Mufflers are more than just a noise nuisance, and should be replaced immediately. Continued use could result in fire or explosion!

H. CHECKING COOLING SYSTEM

Since a correctly-operating Fan is an integral part of the Engine Cooling System, make certain that the Fan Belt is in good condition and properly adjusted before proceeding with Cooling System Checks.

1. **COLD ENGINE ONLY** - Check Engine Coolant (antifreeze/water) and add Coolant in the Reserve Tank as needed to bring level up to the FULL mark. See Figure 5.7.

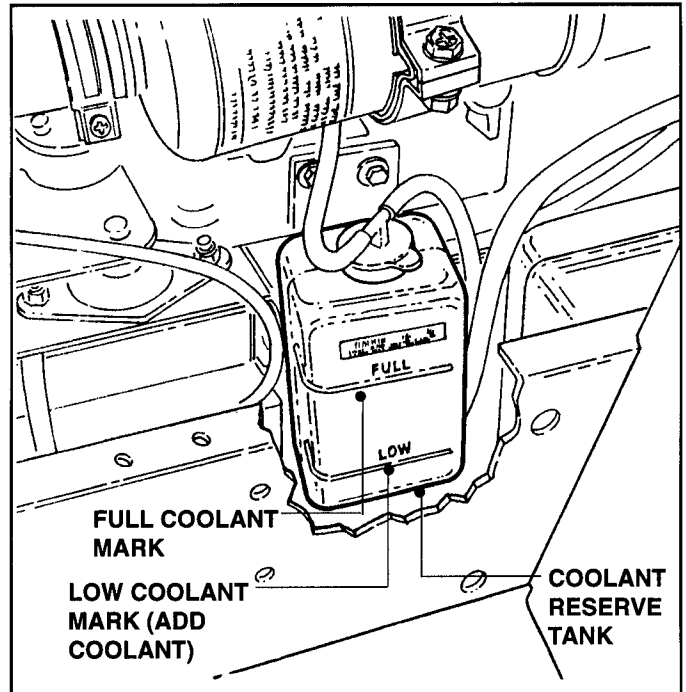


FIGURE 5.7

2. When adding Coolant, first mix the antifreeze and water, then pour the mixture into the Radiator. (Refer to STANDARD SAE J814c & SAE J1034 for mixing antifreeze and water). See Chart below.

Vol % Antifreeze	Freezing Point		Boiling Point	
	°C	°F	°C	°F
40	-24	-12	106	222
50	-37	-34	108	226
60	-52	-62	111	232
70	-64	-84	114	236

Section V - ENGINE & FUEL SYSTEM



WARNING



DO NOT remove cap from radiator when Engine and Coolant are hot. Coolant is pressurized. Severe burns could result.

3. The Cooling System should be cleaned each 500 hrs. of service or, as follows:
 - a. Winter Service (before adding antifreeze).
 - b. Summer Service (switching from antifreeze mixture to water only).

NOTE

When cleaning the Cooling System, the use of Kubota Detergent No. 20 (or equivalent) is recommended for effectively washing away any rust buildup.

4. Check all Hoses for condition and leaks. Tighten or replace items as required.

5.2 ENGINE REMOVAL (KUBOTA 22 HP DIESEL ENGINE)

A. DISCONNECT ELECTRICAL COMPONENTS (See 1 thru 10 as follows)

1. Battery (Black Neg. (-) Wire first, Red Pos. (+) Wire last).
2. Remove Drive Belts from Electric Clutch, then disconnect Electric Clutch Pigtail from Main Harness. Remove Wire Clamps. See Figure 5.8.

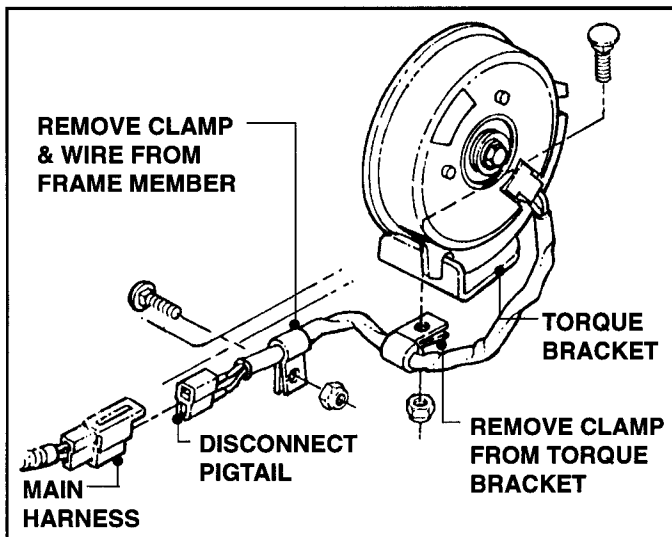


FIGURE 5.8

3. Disconnect the three (3) Wires from the Starter Solenoid (L.H. Side).
4. Disconnect Spade Connectors from Heat Sensor and Oil Sensor Plugs.
5. Separate the Wire Loom (close to the Alternator) and find the two (2) Spade Connections to the Alternator. Disconnect.

6. Separate the Plastic Loom attached to the Radiator Support and disconnect the three (3) Spade Connections to the Solenoid mounted on the R.H. Side of Engine.
7. Remove Red/Black Wire from GLO-PLUG STRIP. See Figure 5.9.

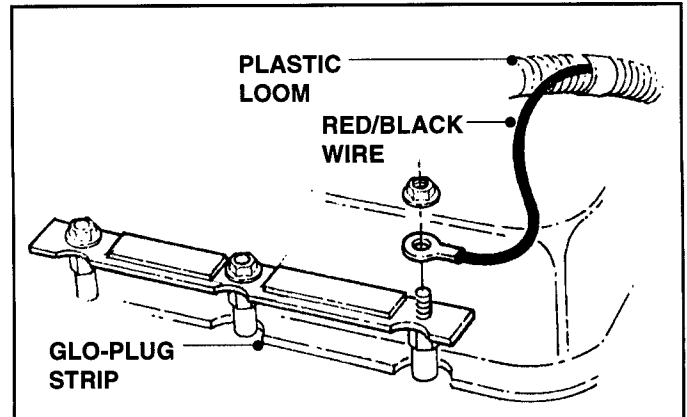


FIGURE 5.9

8. Remove Wire Loom and Wires from L.H. Side of Engine. Coil and store out of way.
9. Disconnect Ground Cables from rear of Solenoid Mounting Bracket (R.H. Side). Store out of way.
10. Check to see if any other wiring would hamper Engine removal. If so, disconnect wiring and store out of way.

B. DISCONNECT MECHANICAL COMPONENTS (See 1 thru 10 as follows)


1. Disconnect Throttle Control from Engine. Loosen or remove Cable Retaining Clamps and store Throttle Cable out of way.
2. Tilt Seat forward and remove V-Belts from Upper Drive Shaft Pulley.
3. Loosen Nuts on Upper Drive Shaft Bearing.
4. Working from left side of unit, separate the Upper Drive Shaft from the Engine. Push Drive Shaft forward to clear Engine.
5. Remove the four (4) 3/8 - 16 x 2-1/2" Hex Cap Screws, 3/8 - 16 Nyloc Nuts, 3/8" Flat Washers and Snubbing Washers which secure the Engine to the Isolator Mounts.
6. Disconnect Fuel Feed Line from Fuel Filter. Plug Line.
7. Disconnect Fuel Return Line from R.H. top rear of Engine Block. Plug Line.
8. Remove Fuel Return Line from Clamps located on Radiator Brace and L.H. Side of Radiator.

Section V - ENGINE & FUEL SYSTEM

9. Check Engine and Radiator to make sure that all Wires, Hoses, etc. which would interfere with Engine removal have been disconnected.
10. Attach Chain Hooks to Lift Eyes on Engine/Radiator Assembly and slowly lift up and away from Frame.


5.3 ENGINE INSTALLATION (KUBOTA 22 HP DIESEL ENGINE)

A. Repair or replace Engine and install in reverse order of removal.



**IMPORTANT!
CAUTION**

When installing a new or repaired Kubota Engine on the OFZ, make certain that the Chassis Ground Cable is securely grounded to the Lower Chassis (Frame). This is important! If the Cable is not grounded, the Circuit will seek a ground through the Engine. This circumstance can burn out the Main Bearings of the Engine in less than 40 hours of operation.



B. If making repairs to the Engine removed, consult the Charts shown below for the correct Torque Values applicable to Kubota Engines.

TORQUE VALUES CHART - SPECIAL USE NUTS, BOLTS & SCREWS

ITEM	SIZE & PITCH	FT. - LBS.	N•M	KGF•M
* Head Cover Cap Nuts	M6 x 1.0	2.9 to 4.3	3.9 to 5.9	0.4 to 0.6
* (**) Head Bolts	M8 x 1.25	28.9 to 32.5	39.2 to 44.1	4.0 to 4.5
* Bearing Case Bolts 1	M6 x 1.0	9.4 to 11.6	12.7 to 15.7	1.3 to 1.6
* Bearing Case Bolts 2	M7 x 1.0	19.5 to 22.4	26.5 to 30.4	2.7 to 3.1
* Flywheel Bolts	M10 x 1.25	39.8 to 43.4	53.9 to 58.8	5.5 to 6.0
* Connecting Rod Bolts	M7 x 0.75	19.5 to 22.4	26.5 to 30.4	2.7 to 3.1
* Idle Gear Shaft Bolts	M6 x 1.0	7.23 to 8.32	9.81 to 11.28	1.00 to 1.15
* Fan Drive Pulley Bolt	M12 x 1.5	72.3 to 79.6	98.1 to 107.9	10.0 to 11.0
* Glow Plugs	M8 x 1.0	5.8 to 10.8	7.8 to 14.7	0.8 to 1.5
* Nozzle Holder Assembly	M20 x 1.5	36.2 to 50.6	49.0 to 68.6	5.0 to 7.0
* Oil Switch Taper Screw	PT 1/8	10.8 to 14.5	14.7 to 19.6	1.5 to 2.0
* Injection Pipe Retaining Nuts	M12 x 1.5	18.1 to 25.3	24.5 to 34.3	2.5 to 3.5
* Oil Drain Plug	M12 x 1.25	23.9 to 27.5	32.4 to 37.3	3.3 to 3.8

* Before installation, apply oil to threads.
 * (**) Consult Kubota WORKSHOP MANUAL for tightening sequence of Head Bolts.

TORQUE VALUES CHART - GENERAL PURPOSE NUTS, BOLTS & SCREWS

SIZE	FT. LBS.	N•M	KGF•M	FT. LBS.	N•M	KGF•M
M6	5.8 to 6.9	7.9 to 9.3	0.80 to 0.95	7.23 to 8.32	9.8 to 11.3	1.00 to 1.15
M8	13.0 to 15.2	17.7 to 20.6	1.8 to 2.1	17.4 to 20.3	23.5 to 27.5	2.4 to 2.8
M10	28.9 to 33.3	39.2 to 45.1	4.0 to 4.6	35.4 to 41.2	48.1 to 55.9	4.9 to 5.7
M12	46.3 to 53.5	62.8 to 72.6	6.4 to 7.4	57.1 to 66.5	77.5 to 90.2	7.9 to 9.2

No Grade or Grade 4

Standard Screw and Bolt SS41, S20C

Grade 7

Special Screw and Bolt S43C, S48C (Refined)

Section V - ENGINE & FUEL SYSTEM

5.4 ENGINE MAINTENANCE (KUBOTA 23 HP GASOLINE ENGINE)

NOTE

Maintenance of the Kubota 23 HP Gasoline Engine is primarily the same as that of the Diesel Engine (Refer to 5.1 thru 5.3 for procedures). Listed below are those items found on the Gasoline Engine which require different service than the Diesel.

A. ENGINE OIL

1. Change Engine Oil on a regular schedule. Use only those oils classified for Service SF, SE, SD or SC. These oils will keep the Engine cleaner and will help retard the formation of gum and varnish deposits. DO NOT use oil additives!
2. Refer to the following Chart for recommended Grades to use with temperature range anticipated before next oil change.

RECOMMENDED SAE VISCOSITY GRADES

			30					
	10W-30							
	5W-20, 5W-30 *							
*F	-20	0	20	40	60	80	100	
*C	-30	-20	-10	0	10	20	30	40
Temperature Range Anticipated Before Next Oil Change								

* If not available, a synthetic oil may be used having 5W-20 or 5W-30 viscosity.

B. OIL FILTER

1. Change Oil Filter after first 50 hours of operation and at each oil change thereafter.

C. SPARK PLUGS

1. Spark Plugs should be cleaned or replaced (if necessary) and Gap reset to .039 to .043 (1.0 to 1.1 mm) every 100 hours of operation or every 6 months, whichever comes first.
2. To clean, remove Spark Plug from Engine, scrape or wire brush and wash with a commercial solvent. DO NOT blast clean.

NOTE

Sparking can occur if Wire Terminal does not fit firmly on Spark Plug. Compress Terminals if necessary.

D. MUFFLER

1. When servicing Engine, inspect Muffler for signs of damage or deterioration. Replace as required.
2. Make sure that Muffler Guard (if applicable) is always in place and secure before allowing mower to leave the shop.



CAUTION



Worn out Mufflers are more than just a noise nuisance, and should be replaced immediately. Continued use could result in fire or explosion!

E. AIR CLEANER

(Consult Engine Manual for Part Number of Filter Element).

Inspect Filter during every Engine service or every 25 operating hours (or more often if mower is used under extremely dirty or dusty conditions). See Figure 5.10.

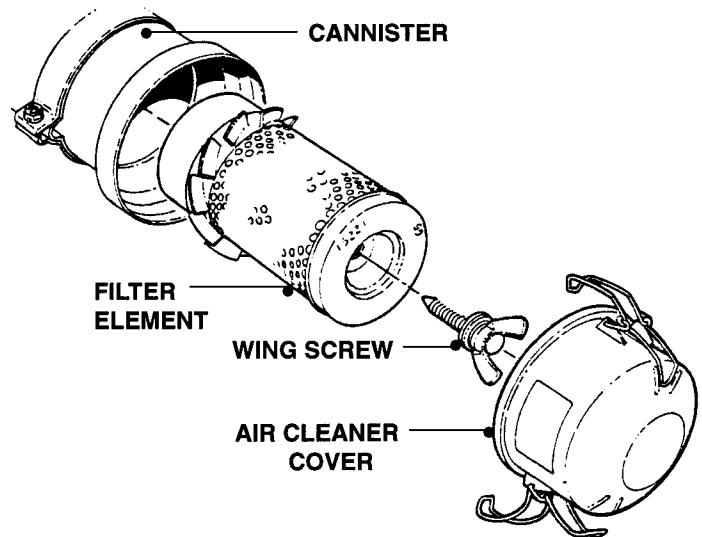


FIGURE 5.10

1. Remove Filter Element from Cannister.
2. To clean the Element, direct a flow of compressed air to the inside of the Element until all debris has been removed (do not exceed 100 psi).
3. Replace Filter Element as required.
4. Always clean Cover inside and out, and clean Cannister before reassembly.



WARNING



Gasoline is flammable and must be handled with care. DO NOT allow open flame, matches or smoking in area. Wipe up any spills. Use approved (RED) fuel container.

1. Check the Inline Fuel Filter at frequent intervals and replace before it becomes clogged with sediment. Replacement Filters are SNAPPER Part No. 4-6364.

Section V - ENGINE & FUEL SYSTEM

2. Make certain that the replacement Filter is correctly installed with the gas flow going to the Engine.
3. Check other Fuel System Components frequently and replace any parts that are leaking or showing worn spots or cracks.

G. CHECKING FAN BELT TENSION

(See Page 5.4, refer to Figure 5.6).

H. CHECKING COOLING SYSTEM

(See Pages 5.4 & 5.5, refer to Figure 5.7).

5.2 ENGINE REMOVAL (KUBOTA 23 HP GASOLINE ENGINE)

(See Pages 5.5 & 5.6, refer to Figure 5.8).

NOTE

Although the Gasoline and Diesel Engines are different, the instructions for their removal are practically the same. Use standard procedures to remove and disconnect those items required for Engine removal.

5.3 ENGINE (FAN) BELT REMOVAL: GASOLINE & DIESEL ENGINES

1. Remove Radiator Screen.
2. Remove Nut and Bolt that secure the top portion of Alternator Cover. Rotate Cover to the side. See Figure 5.11.

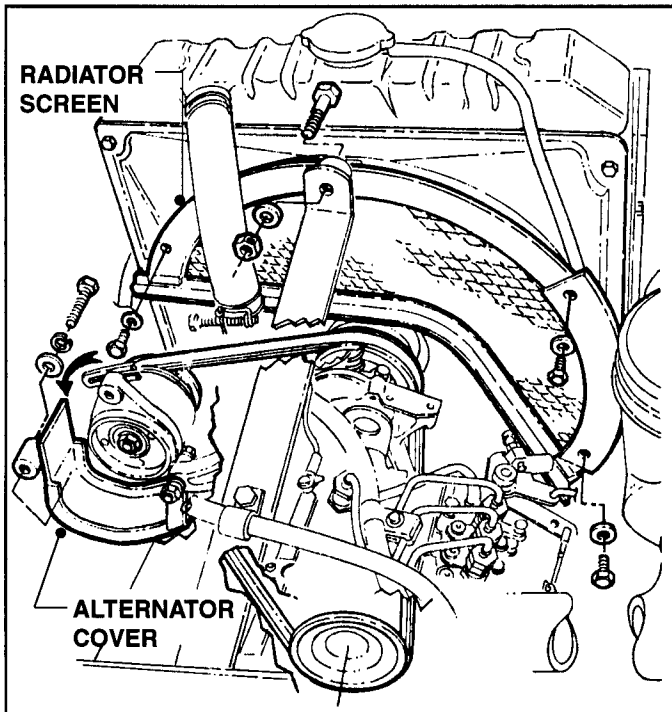


FIGURE 5.11

3. Remove the Nuts and Bolts that secure the Metal Couplings to the Rubber Flex Coupling. Remove Rubber Flex Coupling to allow space to remove and install Belt. See Figure 5.12.

4. Remove Belt from around Pulleys and Fan. Pull Belt through where Rubber Flex Coupling was located.
5. Install new Belt in reverse order.

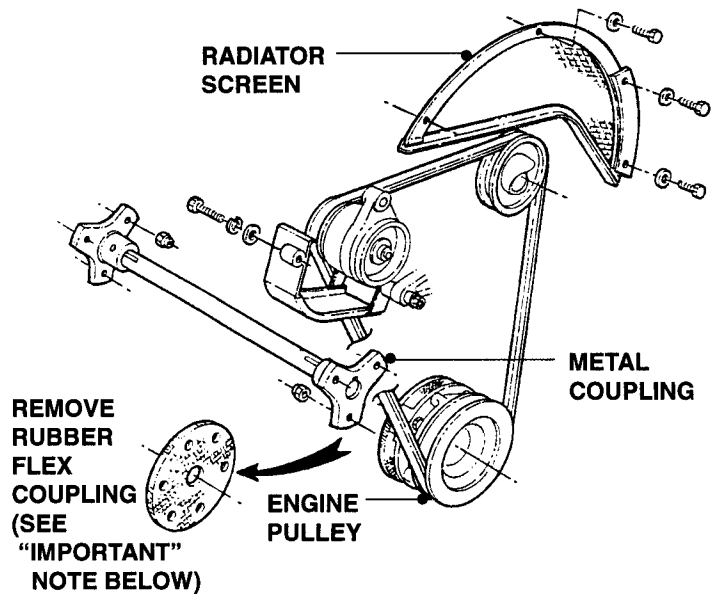


FIGURE 5.12

IMPORTANT!

For those OFZ's equipped with Kubota Diesel Engines, the existing Drive Shaft Coupling should be replaced with SNAPPER #6-3164 UNIVERSAL JOINT/COUPLING KIT. Refer to SNAPPER Instruction No. 7-3582 (I.R. 3/31/00) for installation procedures. See Figure 5.13 below.

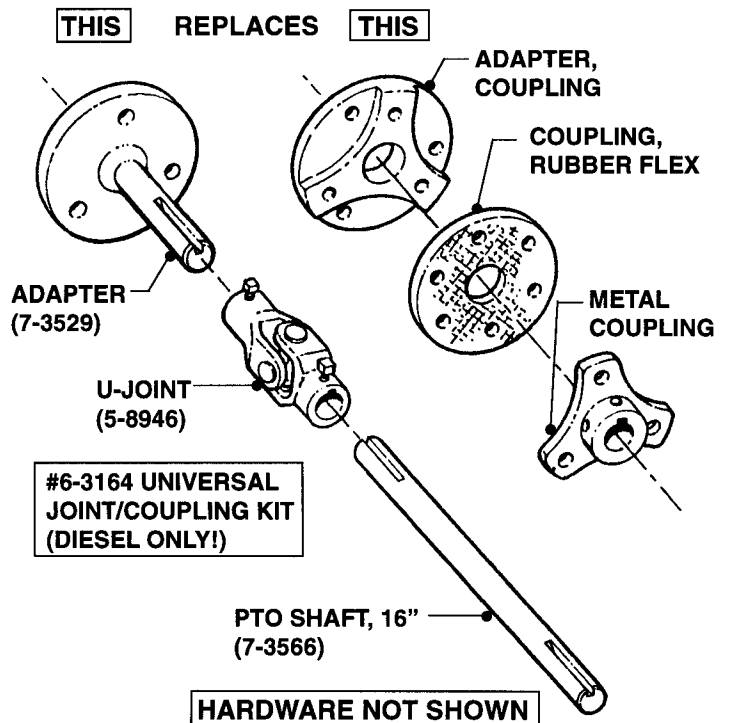


FIGURE 5.13

Section V - ENGINE & FUEL SYSTEM

5.4 FUEL SYSTEM

The Fuel System of the SNAPPER OUT FRONT Z-RIDERS consist of a Fuel Tank, Fuel Filter, Hoses, Clamps and Fuel Tank Support Bracket - all of which mount to the Upper Chassis. Components of the Fuel System are shown in Figure 5.14.

IMPORTANT

The Fuel System should be inspected at each service period. Check for cracks or leaks in the Tank; Valve leakage and Fuel Hose integrity. Replace any item that appears worn or is damaged. Replace Fuel Filter on a regular basis.

5.5 FUEL TANK REPLACEMENT

- Replace L.H. Fender as an assembly (refer to Section VII, "L.H. FENDER REMOVAL").
- Remove the Hose Clamps, Harness Clips and Hoses from the Tank Fuel Outlets.
- Lift and remove Tank from the Tank Support Bracket.
- Install new Tank in reverse order of removal.

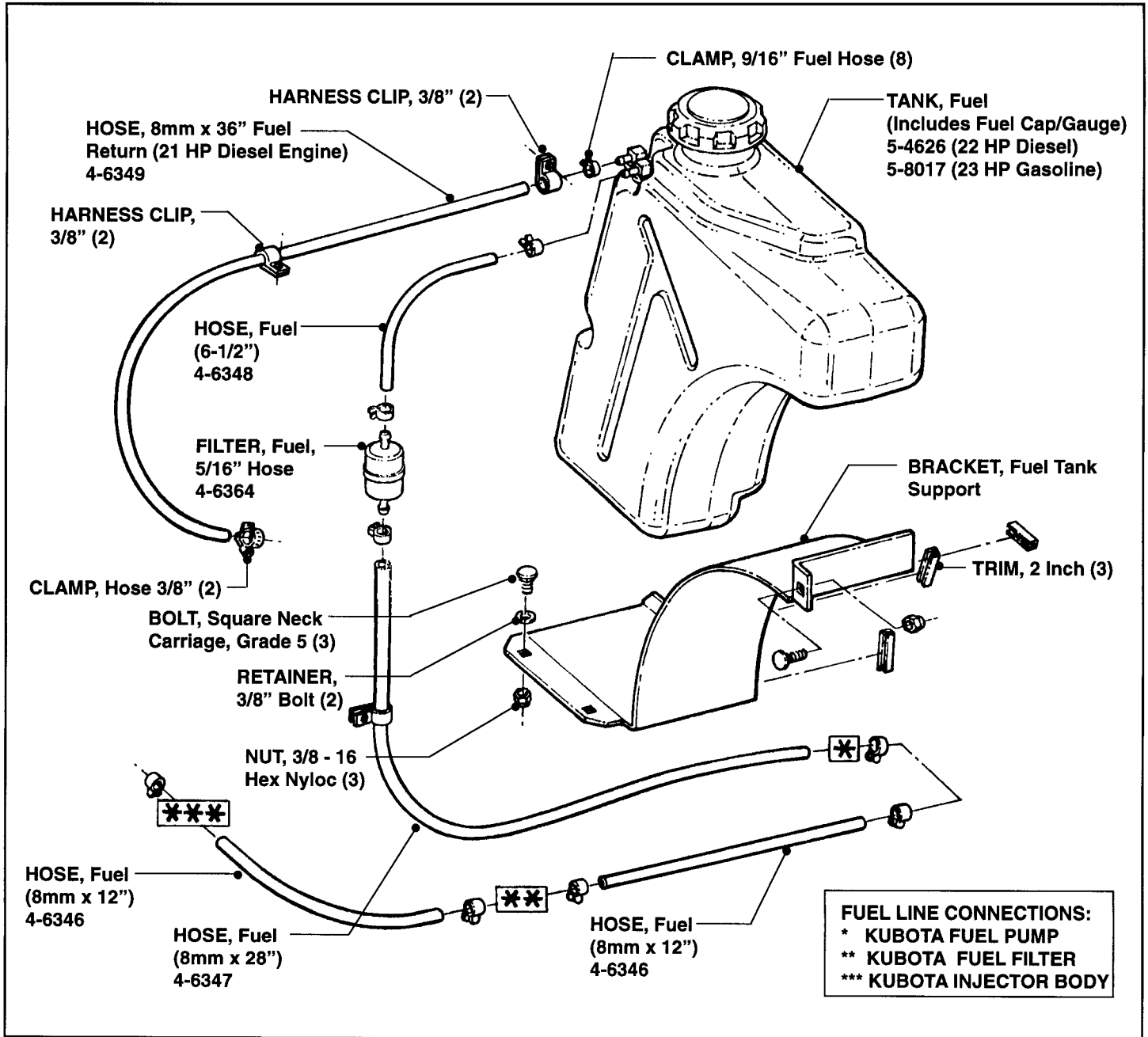


FIGURE 5.14

Section VI

TANDEM HYDRO DRIVE SYSTEM

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<u>ITEM</u>	<u>PAGE No.</u>
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Troubleshooting - Hydro Transaxle	6.2 - 6.5
Controls - Joystick	6.2 - 6.3
Neutral Position Adjustments	6.2 - 6.3
Parking Brake Adjustment	6.3
Individual Drive Wheel/Brake Adjustment	6.3
Hydraulic Reservoir(s) & Hoses	6.3
Hydraulic Fluid	6.3
Parking Brake Assembly	6.4
Conclusion (Troubleshooting - Hydro Transaxle)	6.4
* Removal - Hydro Transaxle Assembly	6.4 - 6.6
* Replacement - Hydro Transaxle Assembly	6.6 - 6.7
Notes	6.8

*** IMPORTANT CHANGE NOTICE! ***

Some OUT FRONT Z-RIDERS are equipped with Kubota DIESEL ENGINES. These Models should have their existing flexible disc drive shaft couplings replaced with the #6-3164 UNIVERSAL JOINT/COUPLING KIT. Refer to SNAPPER INSTRUCTION No. 7-3582 (I.R. 3/31/00).

Section VI - TANDEM HYDRO DRIVE SYSTEM

INTRODUCTION

The 700 Series Hydro Transaxle Assemblies used on the SNAPPER OUT FRONT Z-RIDERS are normally designed for rugged use and maximum endurance. If properly maintained, cleaned and cared for, these units should normally last for the working life of the Power Unit. However, due to accidents and sometimes operator's negligence, the repair shop will have to replace one or both Transaxle Units.

The following information covers basic troubleshooting, removal and replacement of the Hydro Transaxle Assemblies.

6.1 TROUBLESHOOTING - HYDRO TRANSAXLE

If either of the Hydro Transaxles are operating erratically or not at all, SNAPPER recommends that the following Troubleshooting checks be made before replacing the Unit(s).

A. CONTROLS - JOYSTICK

1. Check position of Roll-Release Levers. Make certain they are in "Operating Position". See Figure 6.1.

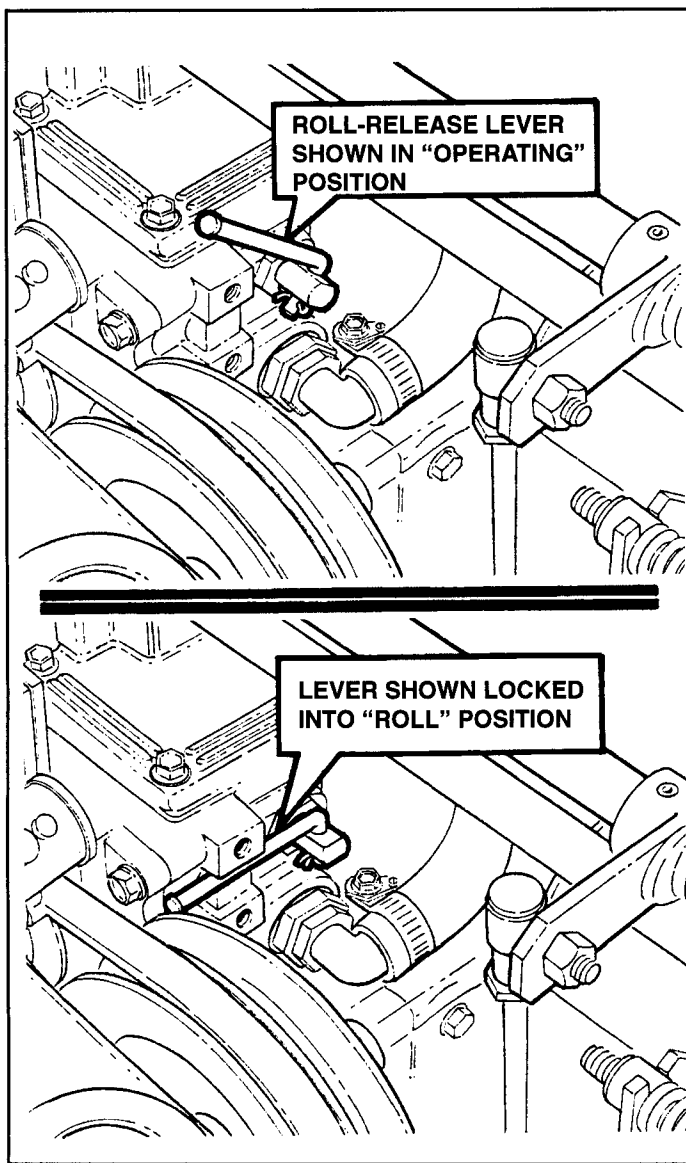


FIGURE 6.1

2. Check the Neutral Position as follows:

- a) Start Engine and release Parking Brake.
- b) Move Joystick forward to begin movement of Unit.
- c) Move Joystick to center or neutral position to stop machine. If machine does not come to a complete stop, or has any movement when Joystick has been moved to neutral position, adjustments are required.

3. NEUTRAL POSITION ADJUSTMENTS

- a) Stop Engine.
- b) Raise Rear Wheels off ground high enough to rotate freely.
- c) Disconnect Brake Rod from Parking Brake. See Figure 6.2.

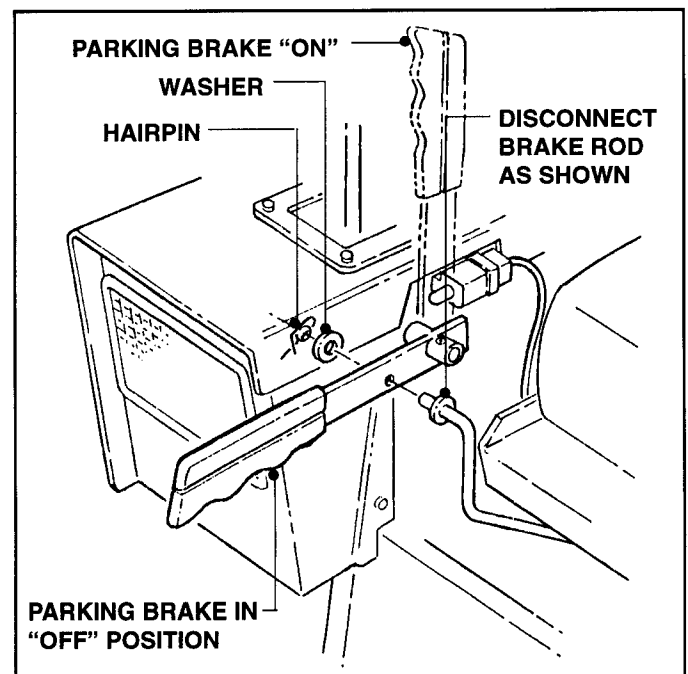


FIGURE 6.2

- d) Pull Parking Brake Lever up to "ON" position.

IMPORTANT

Engaging Parking Brake while Brake Rod is disconnected, locks Joystick in Neutral position.

Section VI - TANDEM HYDRO DRIVE SYSTEM

- e) Start Engine. Neither wheel should rotate or have any movement.
- f) If wheel(s) are rotating, disconnect Transmission Control Rods from Cross Shaft and turn Adjusting Bolts, located on Pump(s), clockwise, or counterclockwise, until rotation stops. See Figure 6.3.

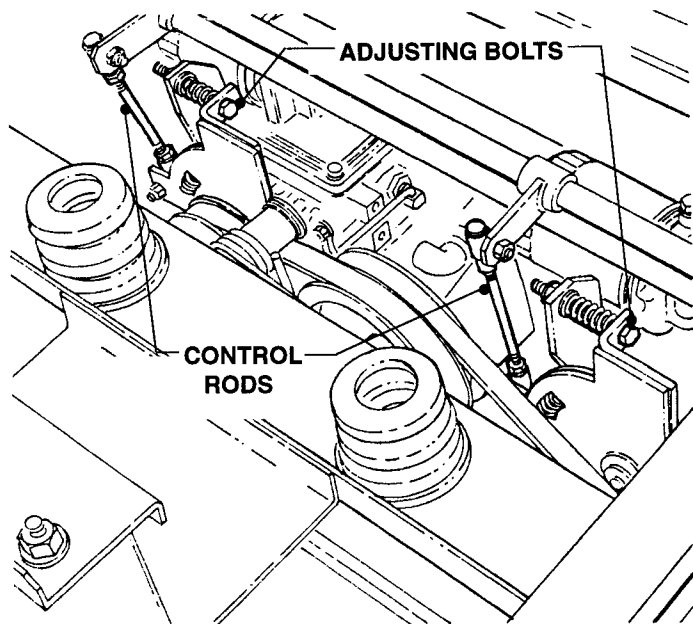


FIGURE 6.3

- g) With wheels in neutral, and not rotating, stop engine and adjust Control Rods until they fit into the Cross Shaft Arms with no wheel creep.
 - h) Reconnect Park Brake Rod.
- 4. BALL JOINT LINK ADJUSTMENTS (JOYSTICK CONTROL)**
- a) Remove the R.H. Fender (Refer to Section VI, Page 7.10).
 - b) Set Park Brake to lock Joystick in position then adjust Ball Joint Links to fit locked position.

NOTE

Other than the Ball Joint Link Assemblies, the Joystick Control has no adjustments.

5. PARKING BRAKE ADJUSTMENT (Both Drive Wheels/Brakes Jointly)

- a) Disconnect Parking Brake Rod from Park Brake Lever. See Figure 6.4, Page 6.4.
- b) Rotate Rod clockwise one (1) turn to tighten Brake or counterclockwise to loosen Brake tension.

NOTE

DO NOT OVERTIGHTEN BRAKE ROD! Damage to Parking Brake components could result.

6. TESTING PARKING BRAKE ADJUSTMENT

- a) Engage Parking Brake.
- b) Try to roll each Drive Wheel to insure there is no movement (Parking Brake should hold both Drive Wheels in place).
- c) If one Wheel can be moved, then adjustment can be performed on the individual Drive Wheels. See 7., INDIVIDUAL DRIVE WHEEL/BRAKE ADJUSTMENT.

7. INDIVIDUAL DRIVE WHEEL/BRAKE ADJUSTMENT

- a) Rotate nut 1/2 turn clockwise to tighten Brake. (See "Inset", Figure 6.4, Page 6.4).
- b) Recheck Drive Wheel for adjustment. If Wheel does not move, adjustment is complete.

NOTE

DO NOT OVERTIGHTEN HYDROSTATIC BRAKE RODS! Damage to Parking Brake components could result.

B. HYDRAULIC RESERVOIR(S) & HOSES

- 1. Check for leaks at connections.
- 2. Check Hoses for kinks, cracks or deterioration.

C. HYDRAULIC FLUID

- 1. Check for proper fluid level (1-1/2" to 2") below top of filler neck.
- 2. Check fluid type (SAE 20W-20, SAE 30 or SAE 40 Motor Oil).
- 3. Check Oil Filter (Part No. 4-2715 Oil Filter).

Section VI - TANDEM HYDRO DRIVE SYSTEM

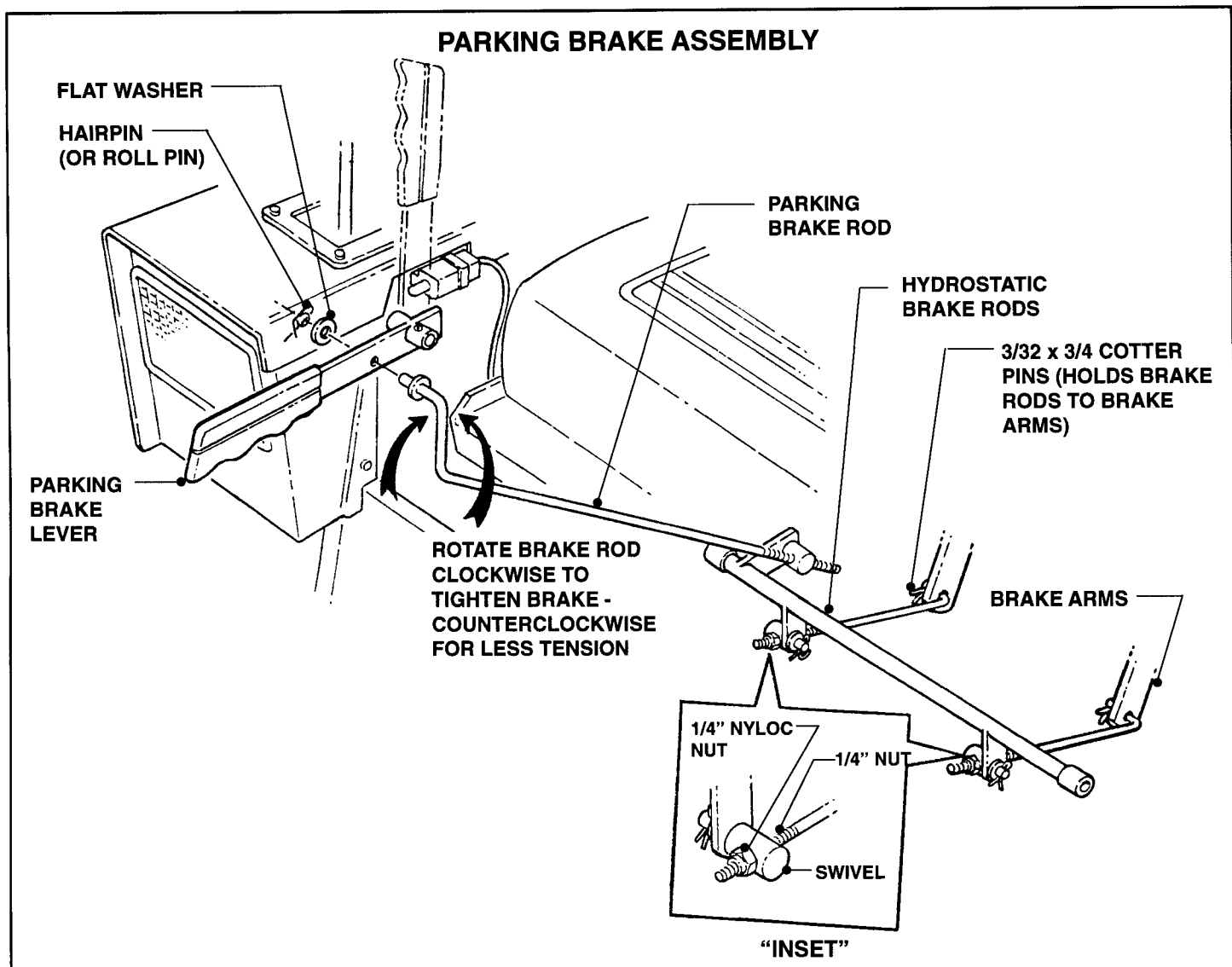


FIGURE 6.4

6.2 CONCLUSION (TROUBLESHOOTING - HYDRO TRANSAXLE)

Having made the checks, tests and adjustments found on the previous two (2) pages, and finding no remedy for a malfunctioning unit, replace the Hydro Transaxle as follows:

6.3 REMOVAL - HYDRO TRANSAXLE ASSEMBLY

A. Disconnect the Battery. Remove NEGATIVE (-) BLACK Cable first and POSITIVE (+) RED Cable last. Secure Cables away from the Battery. See Figure 6.5.

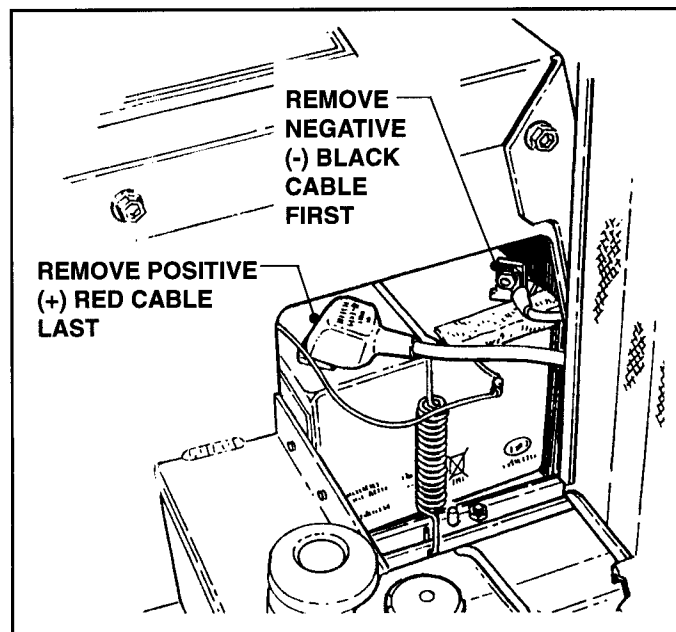


FIGURE 6.5

Section VI - TANDEM HYDRO DRIVE SYSTEM

- B. Remove the 1/4 - 28 Nyloc Nut from the Control Rod on the Neutral Return Cam. Disconnect Rod from Cam. See Figure 6.6.

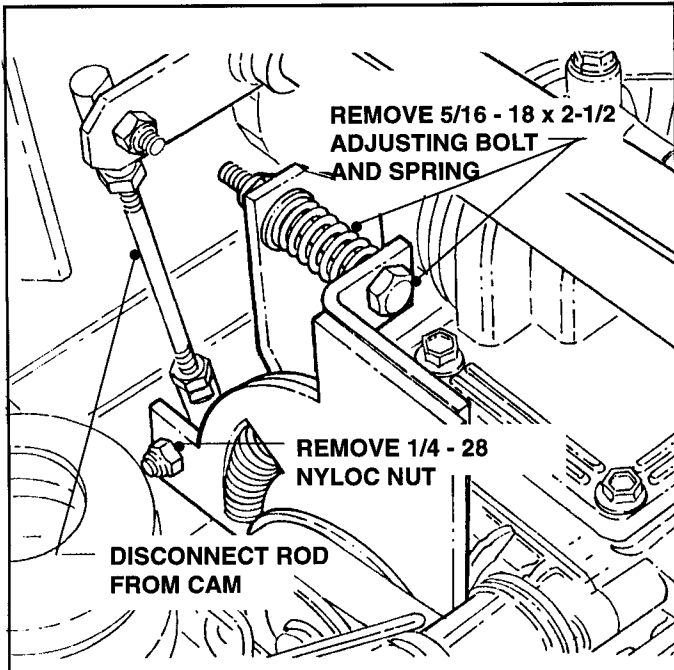


FIGURE 6.6

- C. Remove the 5/16 - 18 x 2-1/2" Neutral Return Adjusting Bolt and Spring. Refer to Figure 6.6.
- D. Depress Idler Pulley and remove Traction Belt from Input Pulley. See Figure 6.7.

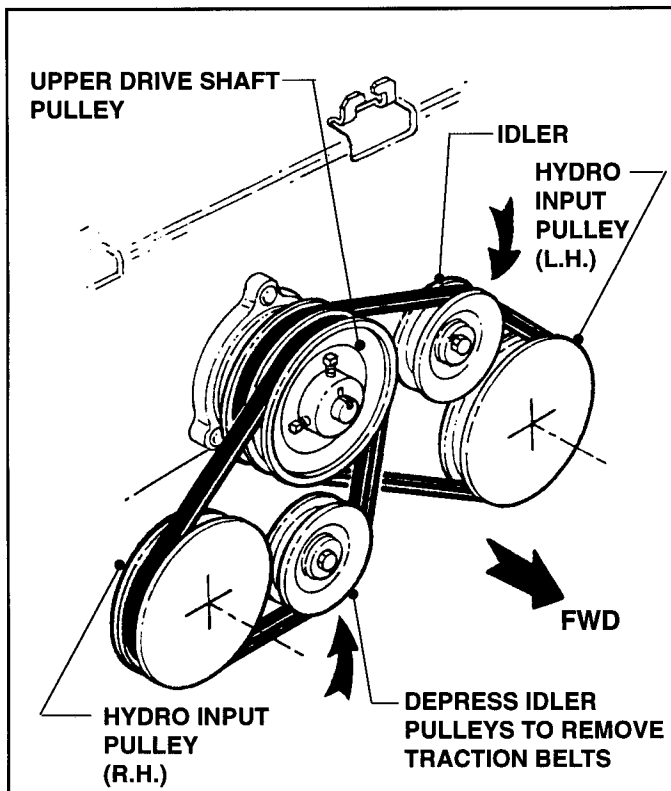


FIGURE 6.7

- E. Place rear of Unit up on jackstands. Chock front Wheels.
- F. Remove Rear Wheel from Transaxle to be removed.
- G. Disconnect the Hydrostatic Brake Rod by removing the 3/32 x 3/4 Cotter Pin from the Brake Arm. Refer to Figure 6.4 on Page 6.4.

NOTE

For additional working space, disconnect the Deck Driveshaft and move it out of the way. See Figure 6.8.

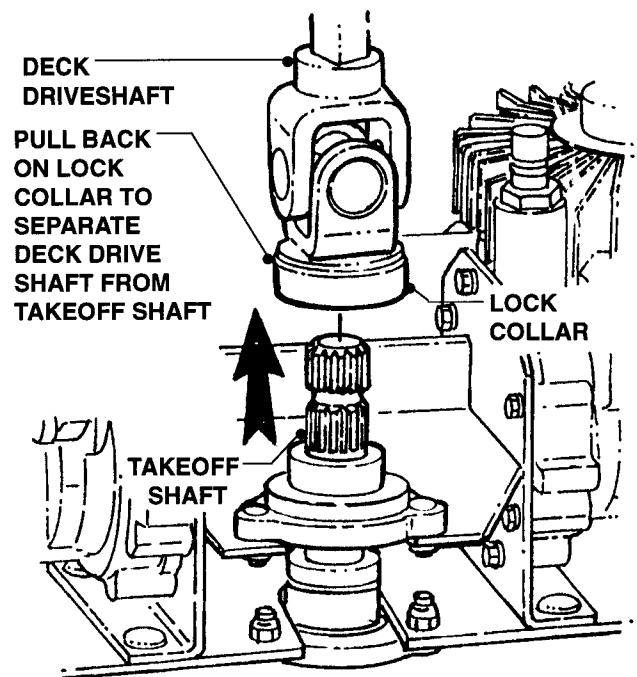


FIGURE 6.8

- H. Place a five (5) gallon container beneath Hydraulic Hose connection of Transaxle being removed. Using cutters or a sharp utility knife, cut Hose located at bottom of Transaxle.
1. Allow oil to drain from system.
 2. Cut Upper Hose.
 3. Remove the 13/16" Hose Clamps from the Hose Stubs.
 4. Split the Hose Stubs with a sharp knife and remove.
 5. Remove the sections of cut Hose from the Hydraulic Reservoir in a like manner. Save Clamps to install new Hoses.
- J. Remove the eight (8) 1/4 - 20 x 5/8 Hex Flange Lock Screws from inside the Bearing Mount Weldment. See Figure 6.9 on following page.

Section VI - TANDEM HYDRO DRIVE SYSTEM

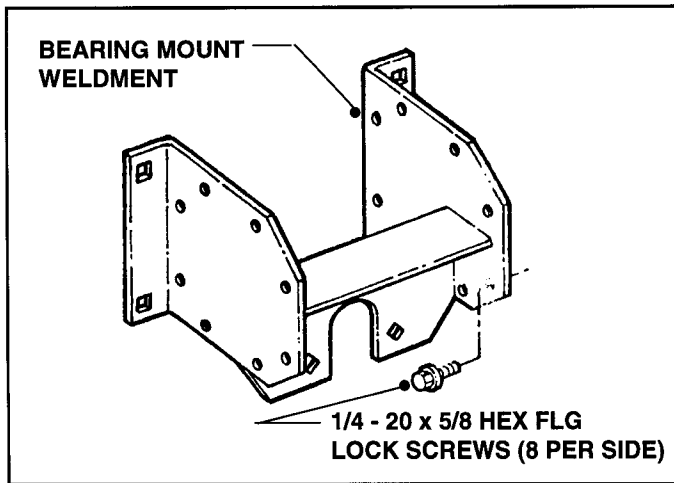


FIGURE 6.9

K. While supporting the Transaxle Assembly in a safe manner, separate it from the Unit by removing the 3/16 - 16 Hex Locknuts, Flat Washers and 3/8 - 16 x 4-3/4" Bolts and Transaxle Spacers. See Figure 6.10. Transaxle Assembly is now ready for repair or replacement.

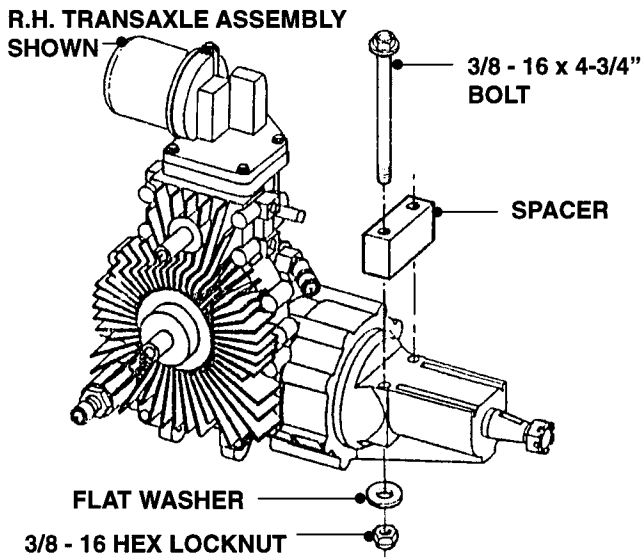


FIGURE 6.10

5.4 REPLACEMENT-HYDRO TRANSAXLE ASSEMBLY

A. Remove the following parts from the Hydro Transaxle Assembly which is to be replaced. See Figure 6.11 on following page.

1. Transmission Pulley

- Loosen the two (2) 5/16 - 18 x 5/16 Sq. Hd. Set Screws.
- Remove the Transmission Pulley and Cooling Fan as an assembly.
- Remove the #605 Woodruff Key.

NOTE

The R.H. and L.H. Transmission Pulleys are different. The Mounting Face of the R.H. Pulley has an extended Boss to compensate for the Offset Drive Belt configuration of the Upper Drive Shaft Pulley.

2. Neutral Return Cam & Neutral Adjustment Plate

- Remove the 1/4 - 20 x 1-1/4 Hex Hd Cap Screw, 1/4 Lock Washer & 1/4 I.D. x 1" O.D. Flat Washer.
- Remove the Neutral Return Cam and #404 Woodruff Key.
- Remove the Neutral Adjustment Plate and the 1" External Retaining Ring.

3. Roll Release Rod

- Remove 1/16 x 1/2 Cotter Pin.
- Remove Roll Release Rod.

4. Hydraulic Fittings (Removal)

- Loosen Inner Nut of Upper Fitting (45°).
- Remove Fitting from Pump.

NOTE

Upper Fitting (45°) - Note Angle of installed position **BEFORE REMOVING!** Fitting must be installed at **SAME ANGLE** in new Transaxle.

- Remove Lower Fitting (Straight).

B. Install new and removed parts to replacement Hydro Transaxle Assembly before installation.

- New Oil Filter (SNAPPER Part No. 4-2715, Eaton Part No. 103144).
- Upper & Lower Hydraulic Fittings.
 - Lubricate NEW O-Ring with Petroleum Jelly. Place O-Ring on Lower (Straight) Fitting and install. Do not overtighten.
 - Place a NEW lubricated O-Ring on Upper Fitting and install at same angle of position as it was when removed. Tighten until snug.
 - Tighten Inner Nut to seal O-Ring.
- Insert Roll Release Rod into Shaft and secure with Cotter Pin.
- Install Neutral Adjustment Plate and secure with 1" External Retaining Ring.
- Install Neutral Return Cam and #404 Woodruff Key. Secure with Flat Washer, Lockwasher and Screw.
- Install Transmission Pulley/Cooling Fan Assembly and loosely tighten the two (2) Set Screws (Pulley will have its final tightening when Traction Belt(s) are aligned).

Section VI - TANDEM HYDRO DRIVE SYSTEM

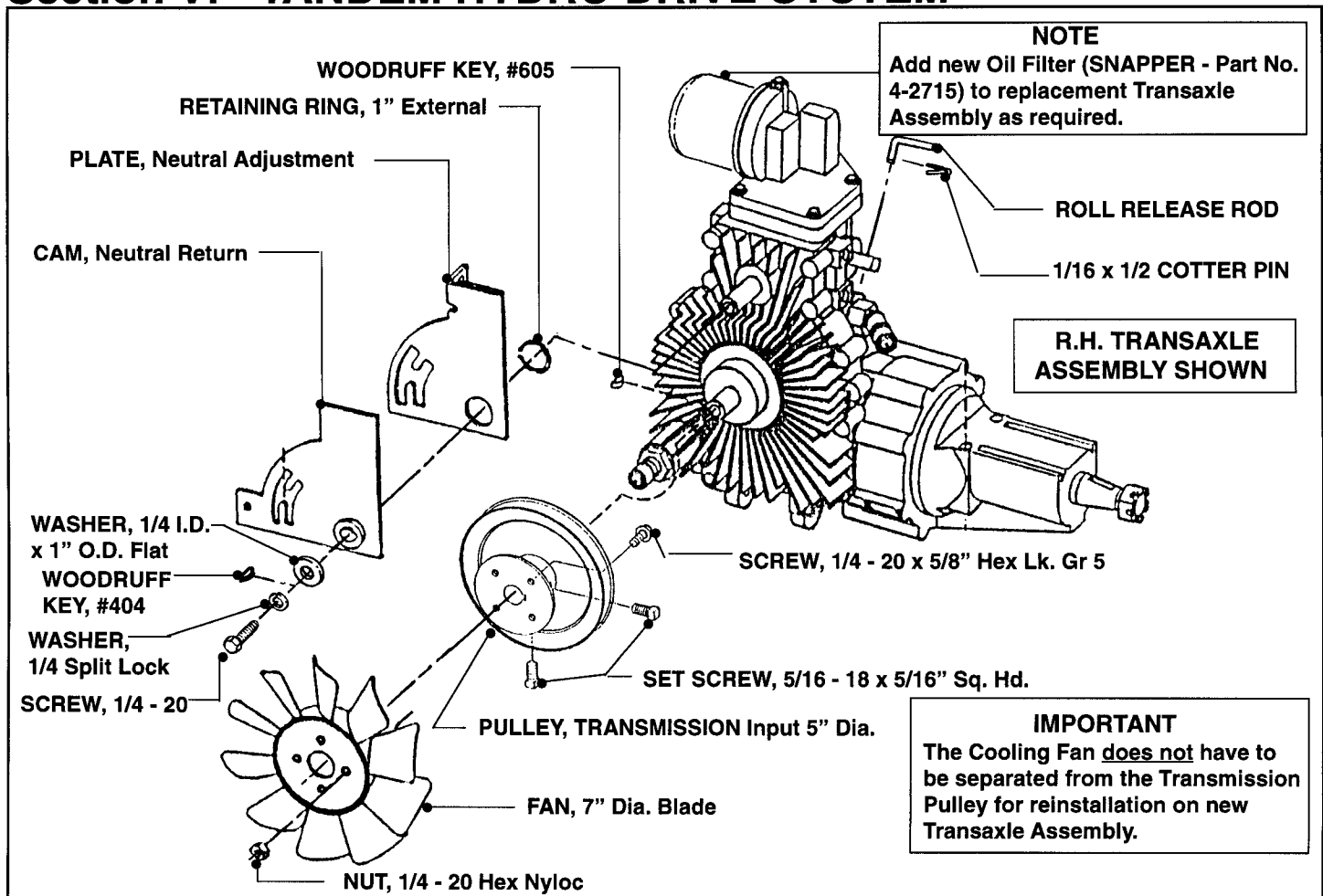


FIGURE 6.11

C. While supporting the new Hydro Transaxle Assembly, align Mounting Holes with their mating holes in the Power Unit Frame.

1. Place the Spacer between the Hydro Transaxle and mounting surface of Frame. Insert the two (2) 3/8 - 16 x 4-3/4" Bolts thru the holes in top of the Frame, Spacer and Transaxle. Secure Bolts with Flat Washers and Locknuts. Torque to 31 Ft. Lbs. (42.16 N•m).
2. Secure the Hydro Transaxle to the Bearing Mount Weldment with the eight (8) 1/4 - 20 x 5/8 Hex Flange Lock Screws. Torque to 8 Ft. Lbs. (10.88 N•m).

D. Attach new Hydraulic Hoses to Transaxle.

E. Reattach Power Transfer Shaft to PTO.

F. Depress Idler Pulley and place Traction Belt(s) over Input Pulley. Move the Input Pulley on its Shaft until the Belt is aligned with Traction Pulley. Tighten the two (2) 5/16 - 18 x 5/16 Sq. Hd. Set Screws.

G. Install the 5/16 - 18 x 2-1/2 Neutral Return Adjusting Bolt and Spring into the Neutral Adjusting Plate and Driveshaft Bracket.

H. Reconnect the Hydrostatic Brake Rod to the Brake Arm.

J. Reconnect Control Rod to Neutral Cam.

K. Reinstall Rear Wheel.

L. Fill Hydraulic Reservoir(s).

M. Reconnect Battery (Refer to Figure 6.5.).

Section VII

CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

CONTENTS

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Section VII - CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

INTRODUCTION

Besides those instructions which detail the removal of parts, this section also gives information about partial disassembly in order to more easily access the Z-RIDER's internal mechanisms. Take a moment to review this section. It will save you time when making adjustments or repairs.

7.1 CASTER WHEEL ASSEMBLY (All Models)

Components of the Caster Wheel Assembly are shown in Figure 7.1.

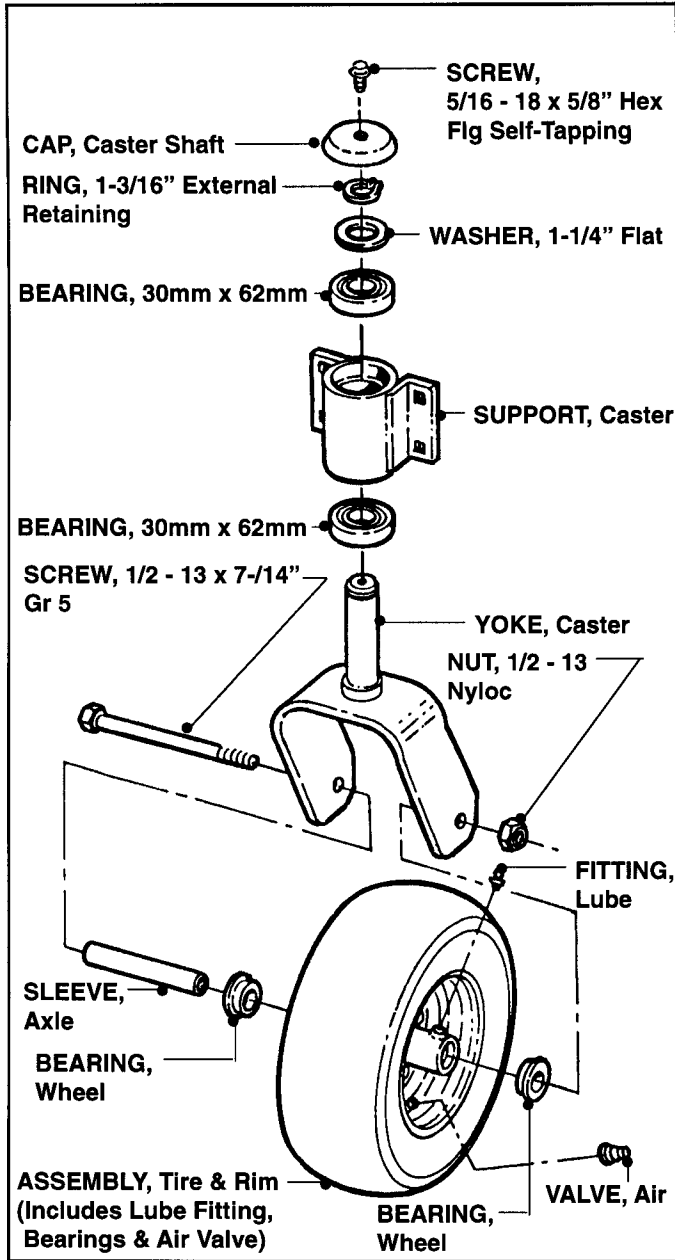


FIGURE 7.1

A. REPLACEMENT OF CASTER SUPPORT BEARINGS

1. Raise and support rear of Power Unit.
2. Remove 5/16 - 18 x 5/8" Hex Flg. Screw.
3. Remove Caster Shaft Cap.

4. While supporting Wheel Assembly from underneath, remove the 1-3/16" External Retaining Ring from top of Caster Yoke.
5. Remove 1-1/4" Flat Washer.
6. Lower the assembled Caster Yoke and Wheel out of the Caster Support.
7. Drive old Bearings out with a Drift Pin.
8. Inspect Bearings surfaces in Caster Support. Remove any burrs or nicks with emery cloth. Clean insides thoroughly with an approved solvent, then wipe dry. Lubricate lightly with GP grease.
9. Lightly grease new Bearings, then press into Caster Support until they bottom-out.
10. Reinstall Caster Wheel in reverse order of removal.

B. REPLACEMENT OF CASTER WHEEL BEARINGS

1. Remove 1/2 - 13 x 7-1/4" Screw and 1/2 - 13 Nyloc Nut from Caster Wheel. Refer to Figure 7.1.
2. Remove Caster Wheel.
3. Remove Axle Sleeve and Wheel Bearings.
4. Clean, inspect and perform any required maintenance on Bearing surfaces of Wheel.
5. Lightly grease, then install new Bearings.
6. Reinstall Axle Sleeve.
7. Reinstall Caster Wheel to Yoke.
8. Lubricate Caster Wheel with Kendall NLGI No. 2 Lithium Grease or equivalent.
9. Check Tire pressure - it should be 12 psi.

C. REPLACEMENT OF OTHER COMPONENTS

Items such as the Tire & Rim Assembly, Caster Yoke, Spacer Tubes and Retaining Hardware may be replaced with new parts during any reassembly sequence. Consult Parts Manual No. 06106 (Rev.2, 11/97), & No. 06113 (Rev. 3, 1/14/00) for replacement numbers. Refer to Figure 7.1.

7.2 CASTER WHEEL/REAR AXLE ASSEMBLY (Models EZF2100DKU, ZF2100DKU & ZF2300GKU)

Components of the Caster Wheel/Rear Axle Assembly are shown in Figure 7.2 on Page 7.3.

A. REMOVAL: CASTER WHEEL/AXLE ASSEMBLY

1. Raise and support rear of Power Unit.
2. Remove 5/16 - 18 x 5/8" Hex Flg. Screw from end of Caster Shaft Cap on Pivot.
3. Remove Caster Shaft Cap.
4. Remove 1-3/16 External Retaining Ring.

(Continued on Following Page)

Section VII - CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

5. Remove two (2) 1-1/4" I.D. x 1-7/8" O.D. Flat Washers.
6. Using an assistant, remove the Assembly by pulling it to the rear and off the Rear Axle Pivot.



CAUTION



When the Caster Wheel/Axle Assembly is free of the Pivot, it will tend to roll over. Be careful when removing!

7. Reverse above steps to install Caster Wheel/Axle Assembly.

B. REPLACEMENT OF AXLE PIVOT BEARINGS

Before attempting to remove/replace Axle Pivot Bearings, either remove both Caster Wheel Assemblies (or) secure the Rear Axle Weldment - with Casters attached - in a vise to prevent movement while servicing.

1. Remove existing Bearings by driving them to the outside with a Drift Pin. (The Bearing Bosses have a machined seating surface. Bearings cannot be removed by driving them inward). See Figure 7.2.

2. Inspect insides of both Bearing Boss surfaces for any dirt or damage. Use emery cloth to eliminate any burrs. Clean insides thoroughly with an approved solvent, wipe dry, then lubricate with GP grease.
3. Press new Bearings (Part No. 3-5602) into Bosses until they bottom-out.
4. Lubricate Pivot Shaft and reinstall Axle Assembly.

C. REPLACEMENT OF AXLE PIVOT

1. Remove Caster Wheel/Axle Assembly (refer to A., Steps 1 thru 6).
2. Remove the four (4) 3/8 - 16 Hex Nuts, 3/8" Flat Washers and 3/8 - 16 x 1-1/2 Carriage Bolts from the Axle Pivot and Power Unit Frame. Refer to Figure 7.2.
3. Install new/repaired Axle Pivot to Lower Chassis by inserting the four (4) 3/8 - 16 x 1-1/2 Carriage Bolts from the inside, attaching the Axle Stop Bracket, Axle Pivot, Washers and Nuts. Tighten securely.
4. Reinstall Caster Wheel/Axle Assemblies.

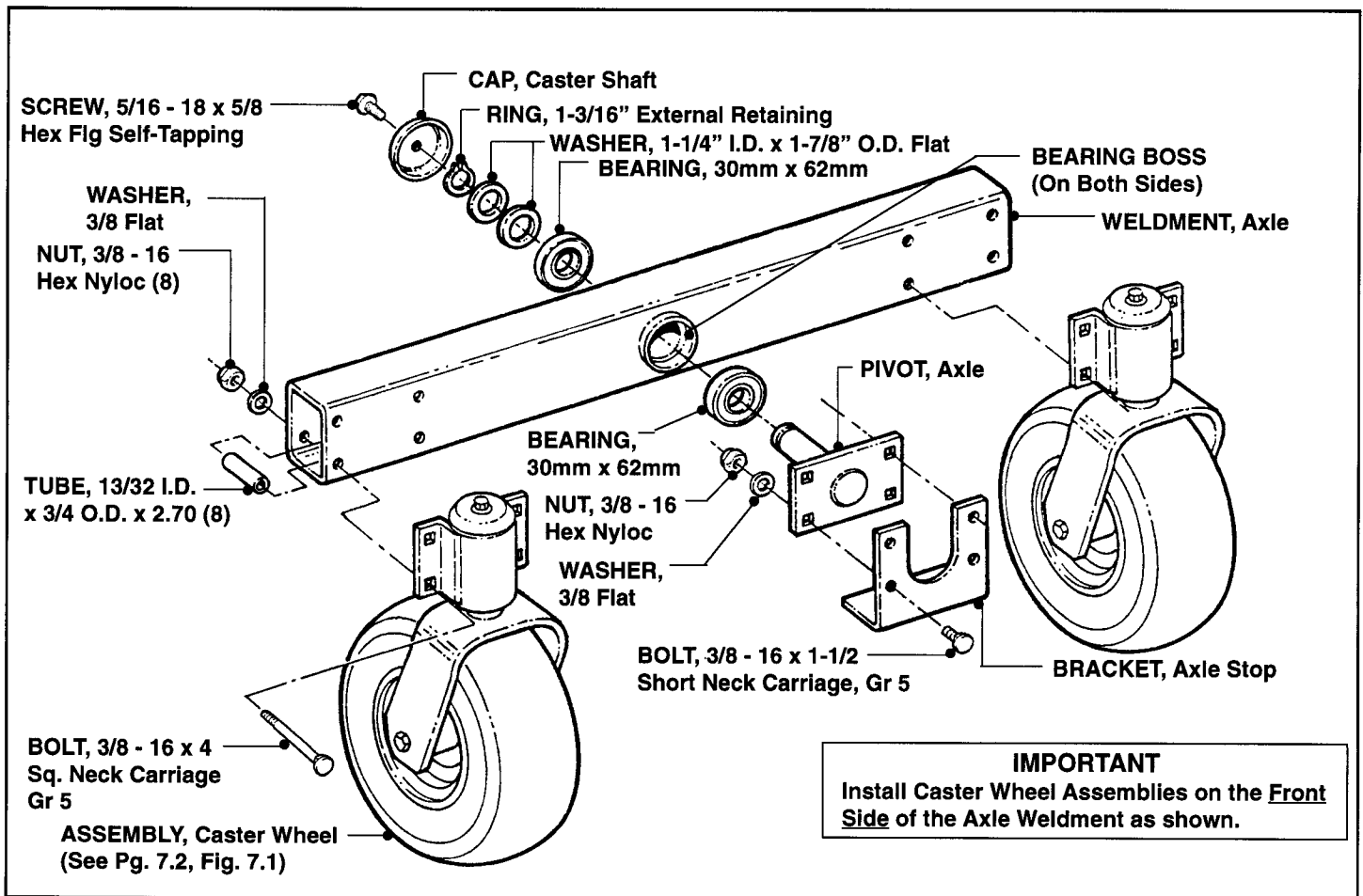


FIGURE 7.2

Section VII - CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

7.3 SEAT & SEAT SUPPORT ASSEMBLIES

Shown below in Figure 7.3 are the Seat Assembly Components for all models of the OUT FRONT Z-RIDER.

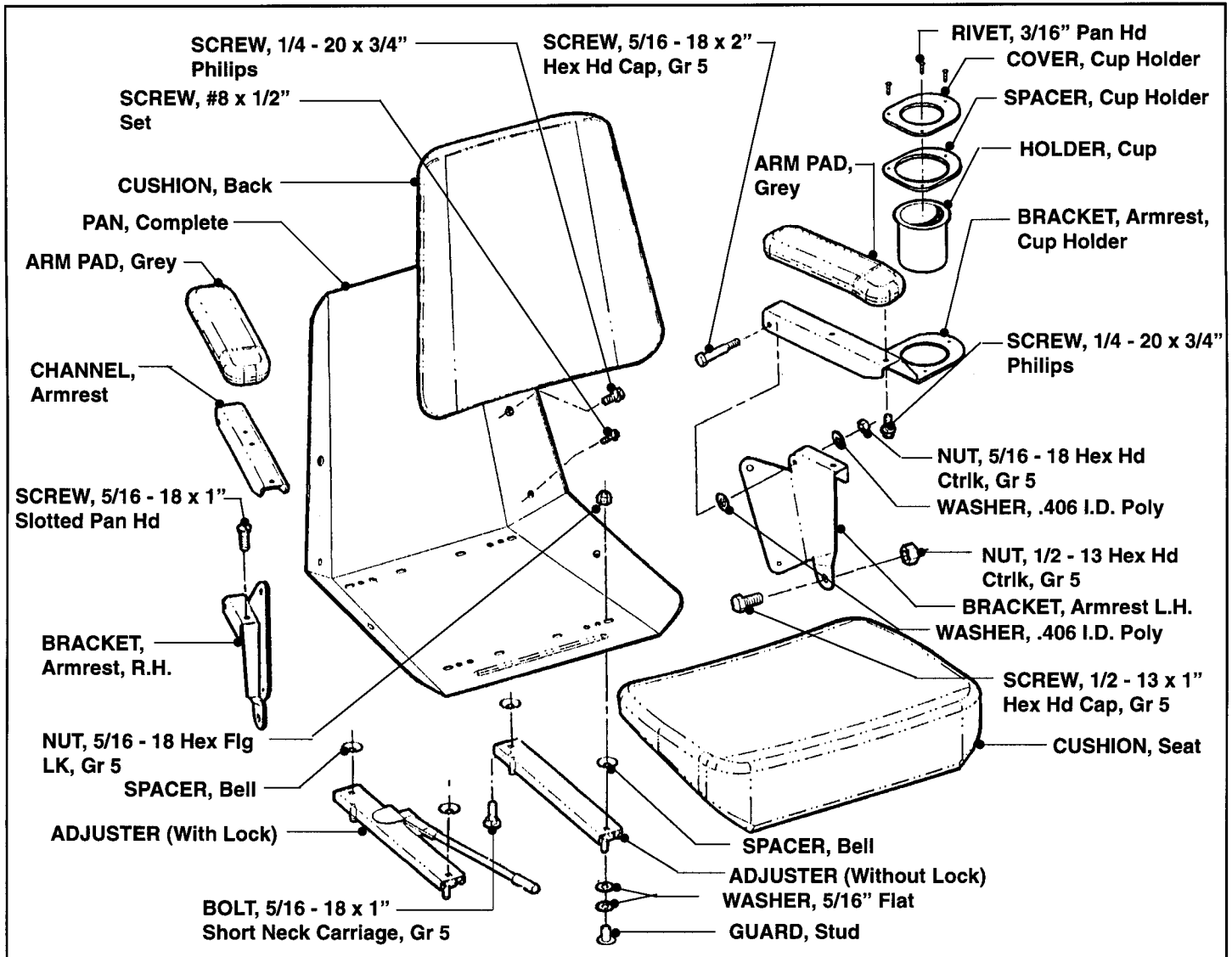


FIGURE 7.3

A. REMOVING SEAT & SEAT SUPPORT ASSEMBLIES

1. Tilt Seat Assembly forward, then disconnect Wiring Harness from Switch. See Figure 7.4.
2. Remove 5/16 - 18 Flanged Lock Nut and Wiring Harness Clamp.
3. Remove Hairpin from Seat Pivot Rod, then remove Rod.
4. Remove the assembled Seat and Seat Support from Unit (refer to Figures 7.4 & 7.5).

B. SEPARATING SEAT & SEAT SUPPORT

(Assemblies do not have to be removed from Unit in order to separate them.)

1. Disconnect Wiring Harness from Switch. Refer to Figure 7.4.
2. Remove Flanged Lock Nut and Wiring Harness Clamp.

(Continued on Page 7.5)

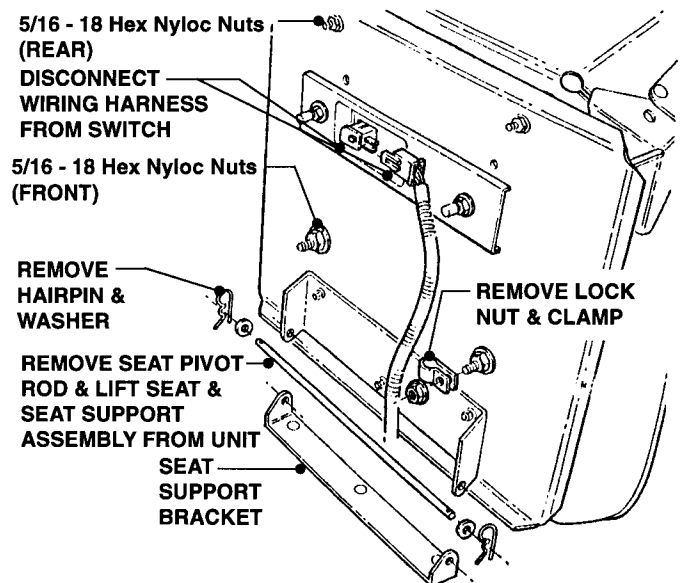


FIGURE 7.4
SERVICE - OUT FRONT Z-RIDER

Section VII - CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

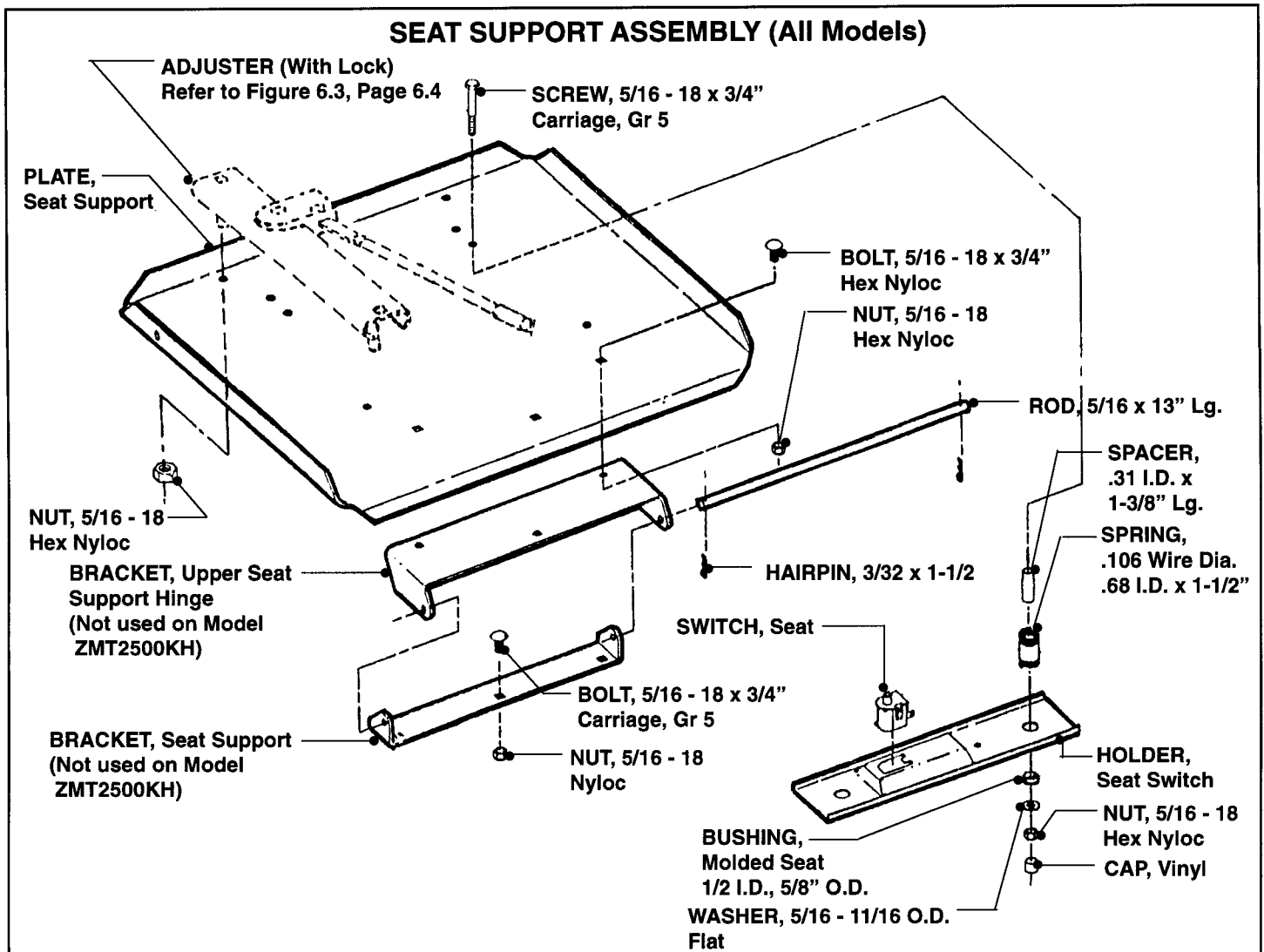


FIGURE 7.5

(Continued from Page 7.4, B. SEPARATING SEAT & SEAT SUPPORT)

3. Remove the two (2) front 5/16 - 18 Hex Nyloc Nuts first (refer to Figure 7.4).
4. Next, while holding Seat Assembly, remove the two (2) 5/16 - 18 Hex Nyloc Nuts from the rear of the Support Plate.
5. Remove Seat Assembly from Seat Support. If Seat Pan requires replacement, it must be ordered as Part No. 5-4117, SEAT ASSEMBLY. See SNAPPER PARTS MANUALS No. 06106 & No. 06113.

C. SEAT SWITCH REPLACEMENT

(Seat Assembly must be separated from Seat Support before Switch can be replaced. See "B. SEPARATING SEAT & SEAT SUPPORT").

1. Remove Vinyl Caps from ends of Screws.
2. Remove the two (2) 5/16 - 18 Hex Nyloc Nuts.
3. Remove the two (2) 5/16 - 11/16" O.D. Flat Washers.

4. Remove Seat Switch Holder from Studs. Refer to Figures 7.4 & 7.5.

NOTE

Make sure not to misplace the Spacers, Springs or Molded Seat Bushings when removing/installing the Seat Switch Holder.

5. Remove Seat Switch.
6. Install new Seat Switch (Part No. 1-7590).
7. Reinstall components in reverse order.

D. REPLACING COMPONENTS OF THE SEAT & SEAT SUPPORT ASSEMBLIES

Figures 7.3, 7.4 & 7.5 show all components of the Seat & Seat Support Assemblies. Replacement of any parts is a straightforward Removal/Installation operation. Consult the Parts Manual for required Part Numbers.

Section VII - CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

(Continued from previous page - CHASSIS & BODY COMPONENTS)

7.4 CHASSIS & BODY COMPONENTS

A. FOOTREST ASSEMBLY

All models of the OUT FRONT Z-RIDER are equipped with identical Footrest Assemblies (refer to SNAPPER Parts Manuals No. 06106 & No. 06113). If damaged, the Footrest should be replaced with a new part. Removal and replacement are straightforward.

B. UPPER CHASSIS & SEAT LATCH ASSEMBLY

The same Chassis & Seat Latch Assembly (Part No.'s) are used on all models of the OUT FRONT Z-RIDER. However, the Kubota-powered (Diesel & Gasoline) have additional Cover Guards not found on the Kohler-powered Units. They are as follows:

Part No.	Description	Model
4-5292	GUARD, Driveshaft	ZF2100DKU
7-1986	GUARD, Driveshaft	ZF2300GKU
7-1992	COVER, Cable	(All Kubota)
7-2276	SHIELD, Drive	(European)

C. LOWER CHASSIS (FRAME)

The different models of the OUT FRONT Z-RIDER are equipped with the following Frames:

POWER MODEL No.	FRAME PART No.	PARTS MANUAL REFERENCE
ZF2200K ZF2500K	4-2589 "	No. 06106 Pages 12 & 13
EZF2100DKU ZF2100DKU ZF2300GKU	4-4840 " "	No. 06113 Pages 14 & 15

D. R.H. FENDER REMOVAL (Fender Remains Assembled)

This removal is for access to the following items:

1. Park Brake Lock
2. Joystick Control Assembly
3. Ball Joint Link Assemblies

1. Disconnect the Battery. Remove NEGATIVE (-) BLACK Cable first and POSITIVE (+) RED Cable last. Secure Cables away from the Battery. See Figure 7.6.

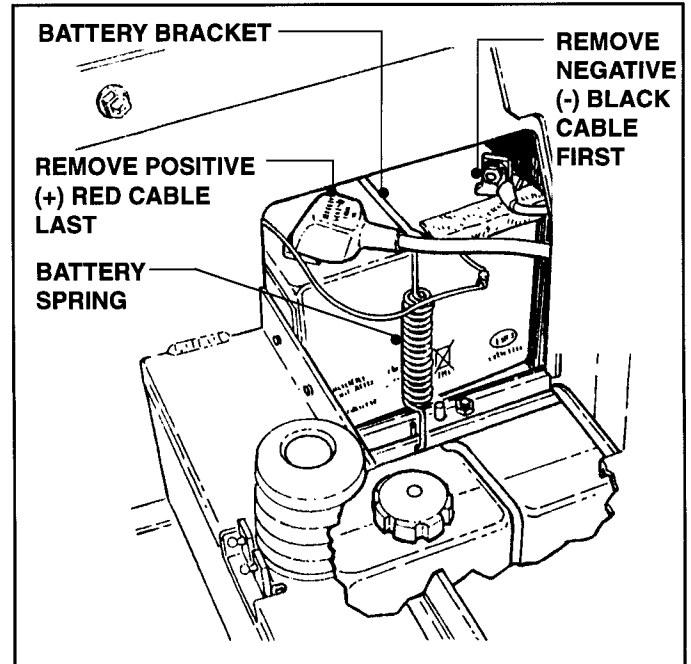


FIGURE 7.6

2. Remove the two (2) Screws from the Control Panel.
3. Lift up on outer side of Panel and disengage the Fender Panel.
4. Lower Panel into opening. See Figure 7.7.

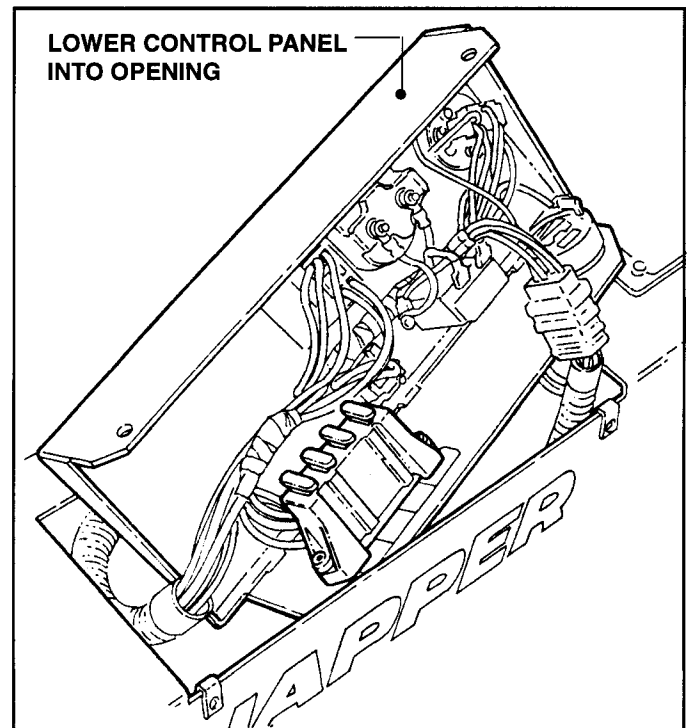
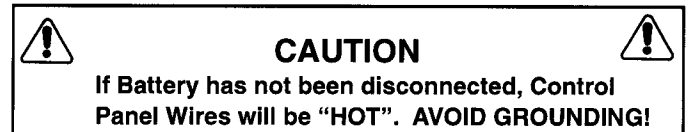


FIGURE 7.7



Section VII - CASTER WHEEL/REAR AXLE, CHASSIS & BODY COMPONENTS

5. Remove Screws from Fender at locations shown in Figure 7.8.

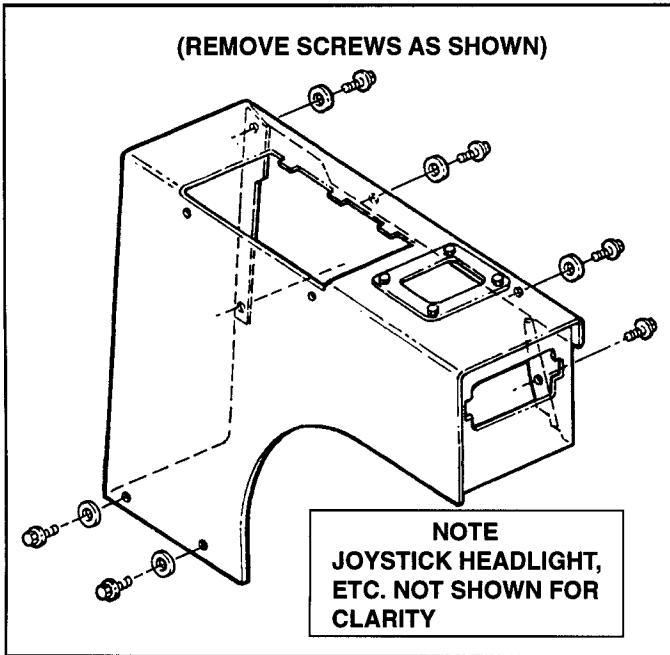


FIGURE 7.8

6. Gently tap inward on Headlight Lens to free Assembly from Bezel.
7. Push Headlight inside Fender. Lay Lens and Bezel aside for later reassembly.
8. Remove assembled Fender by lifting it up and slightly forward.

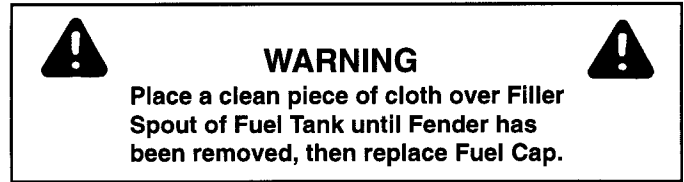
E. L.H. FENDER REMOVAL (Fender Remains Assembled)

This removal is for access to the following items:

1. Fuel Tank.
2. Throttle Control Assembly (Diesel & Gasoline).
3. Choke Control Assembly (Gasoline Only).

1. Remove Handle. See Figure 7.9.
2. Remove Screws from Fender at locations shown.
3. Gently tap inward on Headlight to Free Assembly from Bezel.
4. Push Headlight inside Fender. Lay Lens and Bezel aside for later reassembly.
5. Disconnect Choke and Throttle Cables from Engine, OR remove Choke and Throttle Control Assemblies per Steps 6 thru 8.
6. Remove the Handles from the Choke and Throttle Controls.
7. Remove the four (4) Screws which secure the Choke and Throttle Controls to the Fender.

8. Lower Control Assemblies into Fender Well.
9. Remove Fuel Cap.



10. Remove assembled Fender by lifting it up and slightly forward.
11. Replace Fuel Cap.

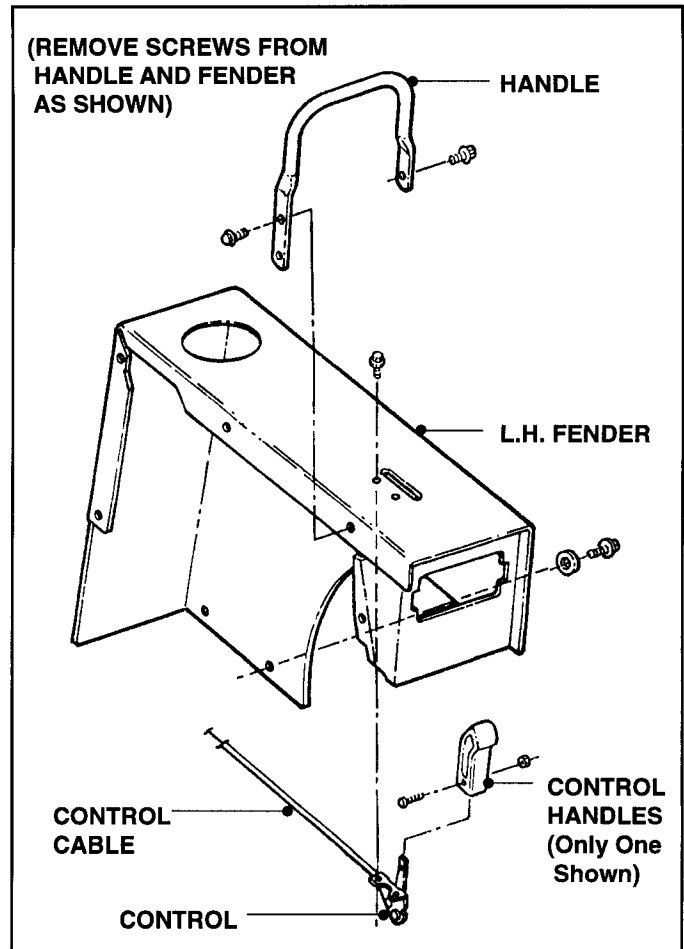


FIGURE 7.9

Section VIII

52" & 61" MOWER DECK

ASSEMBLIES

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Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

INTRODUCTION

This Section will begin by repeating that portion of TROUBLESHOOTING (Sect. II, Pg. 2.3) which deals with mowing problems. In doing so, it will elaborate on the "corrective action" measures taken to solve those problems by giving step-by-step instructions for the adjustment, disassembly, repair or replacement of those components causing the problems.

8.1 PROBLEM - BLADE(S) NOT CUTTING

Move unit to a level, well-ventilated area.

Check the obvious first!

Check Blades. Visually inspect the Deck Drive Belts and Mower Drive Belt for any sign of wear or other damage. Also, check the Power Transfer Shaft for damage and proper connection.

With Engine "OFF" and Spark Plug Wires disconnected, have an assistant to disengage the spring-loaded Deck Idler Pulley while you turn each Spindle Pulley by hand. Blades should turn freely as you turn the individual Pulleys. If not, there is a problem within the Cutter Housing Assembly. (Refer to Sect. IX, CUTTER HOUSING/BLADE ASSEMBLY).

After having made the visual check and finding no apparent problems, release the Deck Idler Pulley. attach the Spark Plug Wires, set the Park Brake and start the Engine.

After Engine has warmed-up, pull the Blade Switch Knob out into the "ON" position to engage Mower Blades. If Mower Blades *DO ENGAGE*, proceed to Step 8.2 PROBLEM - CUTTING GRASS IMPROPERLY.

If Mower Blades *DO NOT ENGAGE*, continue as follows, one step-at-a-time, until problem is solved.

A. FUSE CHECK

1. Turn Engine "OFF".
2. Remove Screws from Control Panel, located on top of R.H. Fender.
3. Lift Control Panel upward to expose Fuse Panel underneath.



CAUTION

Avoid accidental grounding of wires!
Without the Battery being disconnected,
the Wiring System will be "HOT"!

4. Check the 7.5 Amp PTO Fuse. Replace as required. See Figure 8.1.

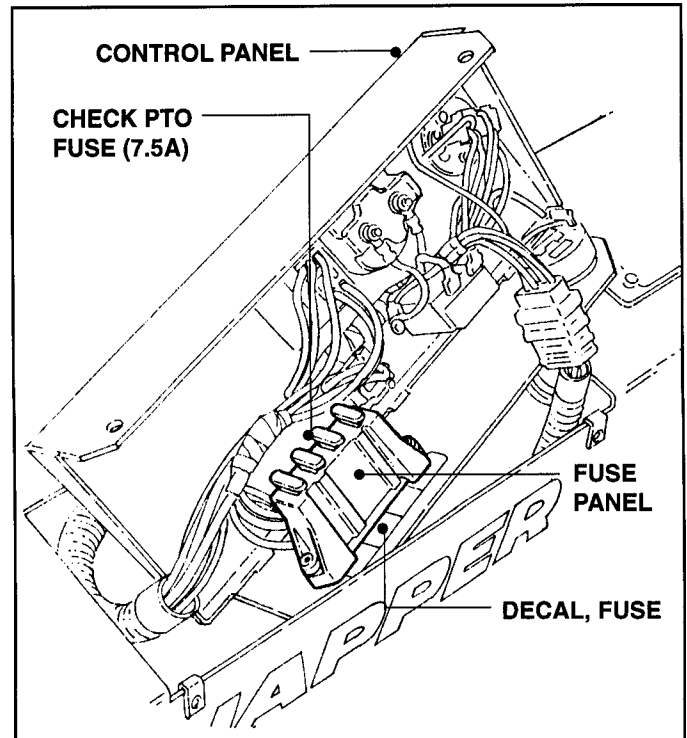


FIGURE 8.1

B. PTO SWITCH TEST

(See Section III - Electrical)

C. DECK DRIVE BELTS (ADJUSTMENT)

If the Deck Drive Belts are slipping, adjust Belt tension as follows:

1. Using a suitable pry bar, disengage the Torsion Spring from the Idler Arm Weldment. See Figure 8.2.

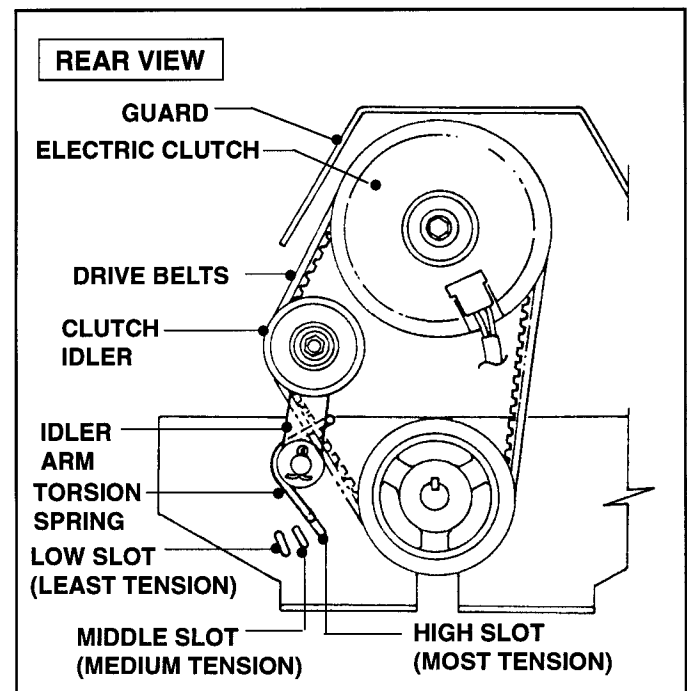


FIGURE 8.2

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

2. Remove lower end of Torsion Spring from its slot location and place in a higher slot to increase Belt tension (a lower slot will decrease Belt tension).
3. Reattach Torsion Spring to Idler Arm Weldment. Refer to Figure 8.2.

D. DECK DRIVE BELTS (REPLACEMENT)

If the Deck Drive Belts which drive the Power Transfer Shaft require replacement, proceed as follows:

1. Depress Clutch Idler and remove both Deck Drive Belts. See Figure 8.3.
2. Install new Belts (Refer to "E. PART No.s - DECK DRIVE BELTS" below).

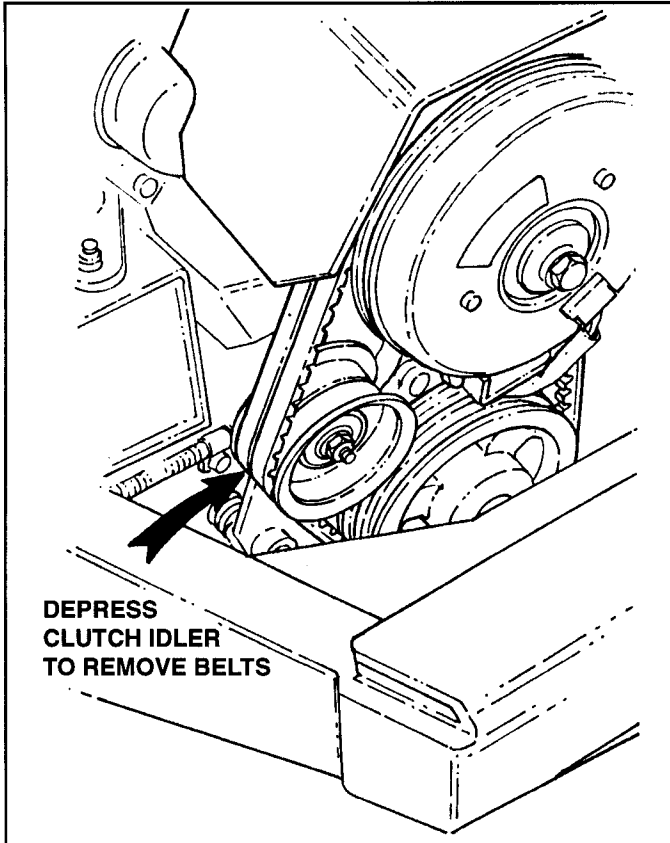


FIGURE 8.3

E. PART No.s - DECK DRIVE BELTS

1. Models ZF2200K, ZF2500K & ZF2500KH
3-5543 Belt, Deck Drive (HA 36.5 Effective Lgth.)
2. Models EZF2100DKU, ZF2100DKU & ZF2300GKU
4-1830 Belt, Deck Drive (HA37.25 Effective Lgth.
- Sold as a Pair)

F. MOWER DRIVE BELT

Replace Mower Drive Belt as follows:

1. Lower Deck to lowest setting.
2. Lift up on Footrest until it locks in the "UP" position.
3. Remove four (4) Knobs that secure the Deck Cover. See Figure 8.4.

4. Remove Cover for access to Deck Belt.

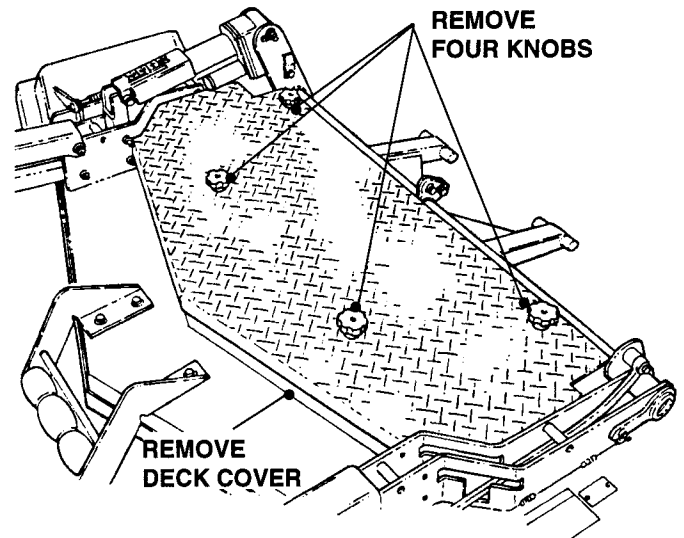


FIGURE 8.4

5. Remove old Belt.
6. Route new Belt around Blade Pulleys and Idler Pulley in the same position as old Belt was removed. It may be necessary to use a pry bar to pull Idler Pulley back to install Belt. See Figure 8.5.
7. Reinstall Deck Cover and Knobs.

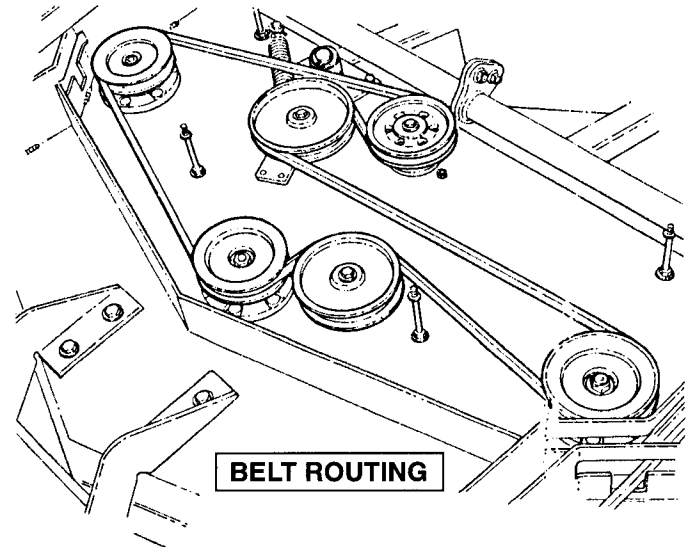


FIGURE 8.5

G. PART No.s - MOWER DRIVE BELT

- | | |
|--------|-------------------------|
| 4-2776 | BELT, 52" HB (122") |
| 3-5542 | BELT, 61" HB (134-1/2") |

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

H. ELECTRIC CLUTCH TEST

(See Section III, ELECTRICAL).

J. GEARBOX

Check Right Angle Gearbox for damage as follows:

1. Check for any severe oil leaks around PTO Input Shaft and Deck Belt Drive Shaft (See "IMPORTANT NOTE" below).
2. If leaks are found, they are probably due to a ruptured Oil Seal.
3. Replace ruptured Seal(s) per Step K., "GEAR BOX SEAL REPLACEMENT".

K. GEARBOX SEAL REPLACEMENT

Earlier Models of the ZF5200M & ZF6100M Mower Units used a different casting for the Right Angle Gearbox Housing than the later models which were introduced in 1999. Both Housings are interchangeable.

IMPORTANT NOTE!

Customers and Operators should be advised that when cutting long grasses (fescue, etc.), they should frequently stop the Unit and clean any debris away from the Power Transfer Shaft and the Right Angle Gearbox Input Shaft. Failure to do so could result in excessive oil leakage due to the Oil Seal being knocked loose from the Gearbox.

1. **PART No.s** **RIGHT ANGLE GEARBOXES**
5-8342 Right Angle Gearbox ('99)
2. Remove Gearbox from Mower Deck.
3. Remove Deck Drive Pulley and Spacer.
4. Remove damaged Seal(s) and replace as illustrated in Figure 8.6.

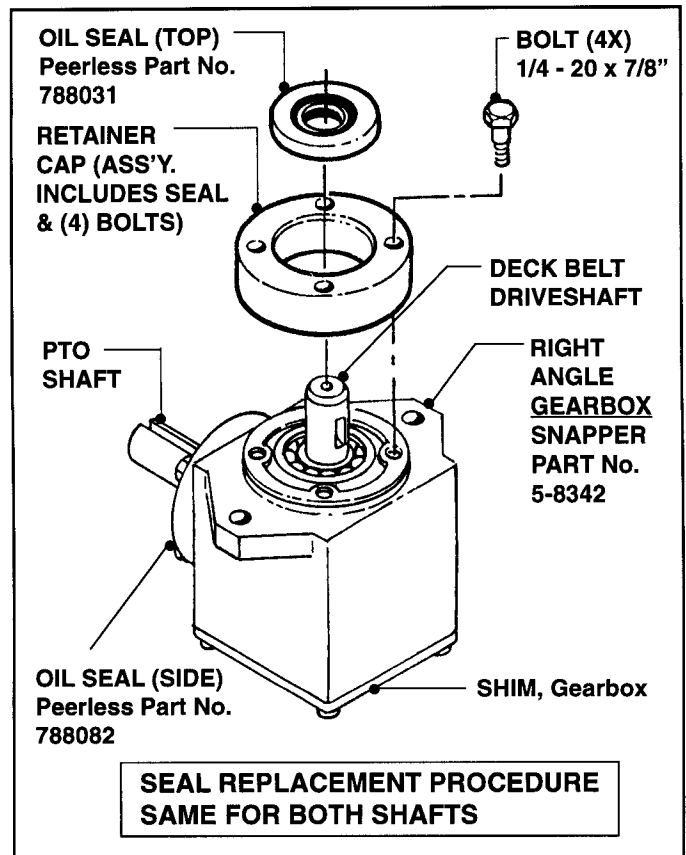


FIGURE 8.6

5. If Gearbox requires additional oil, see "L. GEARBOX LUBRICATION".

L. GEARBOX LUBRICATION

(Gearbox must be removed from Mower Deck for lubrication).

1. Place Gearbox upside-down from its normally-installed position with the Flanges resting on blocks.
2. Remove the four (4) #10 - 24 x 1/2" Screws and the Cover. See Figure 8.7.

NOTE

At this point, the Gearbox may be thoroughly inspected for internal wear or damage. To do so, turn Gearbox back over (onto a container) and allow any oil to drain completely. Inspect and make any repairs. Place Gearbox back onto the blocks.

3. Inspect Gasket. Replace as required.
4. Use 80W90 GEAR OIL (6 oz.) to bring a drained Gearbox to proper "FULL" level.

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

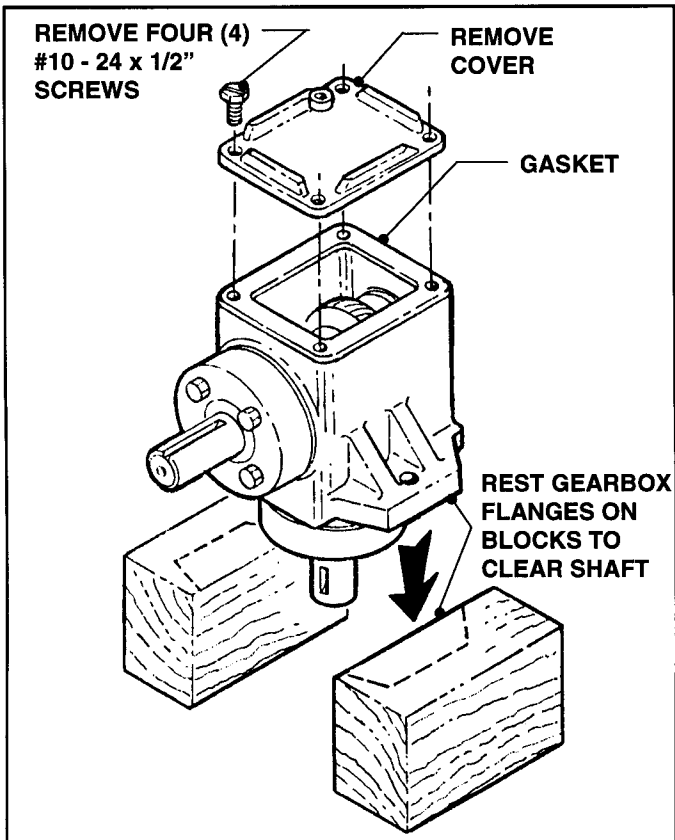


FIGURE 8.7

5. Attach Cover, turn Gearbox over to its operating position and check for any leakage.

8.2 PROBLEM - CUTTING GRASS IMPROPERLY

As previously stated in this section, you should "Check the obvious first"! In this case, visually inspect the tires for obvious pressure differences. Check the number of Spacers above and below each Cutter Spindle to see if each corresponds with the selected cutting height.

Start Engine and allow it to warm. Move Throttle Control to "FAST" position and ascertain if there are any Engine problems (Engine skip; misfire; choking down, etc.) which could cause improper cutting. Measure side-to-side level of Deck, and also, front-to-rear pitch.

A. MOWER DECK ADJUSTMENT (LEVELNESS) SIDE-TO-SIDE and FRONT-TO-REAR

Before making Deck leveling adjustments, check tires and add or release air as needed to bring pressure to 12 PSI in drive tires (Turf Type Tires), 5 PSI (All Terrain Type Tires) and 25 PSI in rear Caster Tires. Pressure in Front Deck Caster Wheels should be 25 PSI.

If tires are properly inflated and mowing is still uneven, adjust Deck levelness as follows:

1. Place Mower on a smooth, level surface.
2. Raise Deck to highest cutting position.
3. Place 2 x 4 blocks under front edge of Deck beside Caster Wheels. Blocks should be on both sides of Deck. Make Deck relatively level by positioning blocks. Both Caster Wheels must be off the ground.
4. Loosen Leveling Bracket at center Rear Deck support. See Figure 8.8. This allows the Lift Arm to settle down into Hitch Brackets.

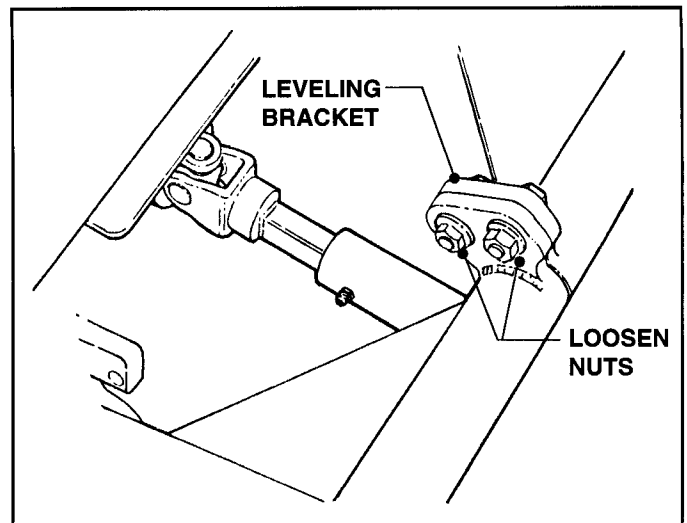


FIGURE 8.8

5. Retighten Leveling Bracket Bolts.
6. Remove both Bolts (one from each side) from the front portion of the Link Weldment. See Figure 8.9. The Front Caster Wheel will then drop to the ground.

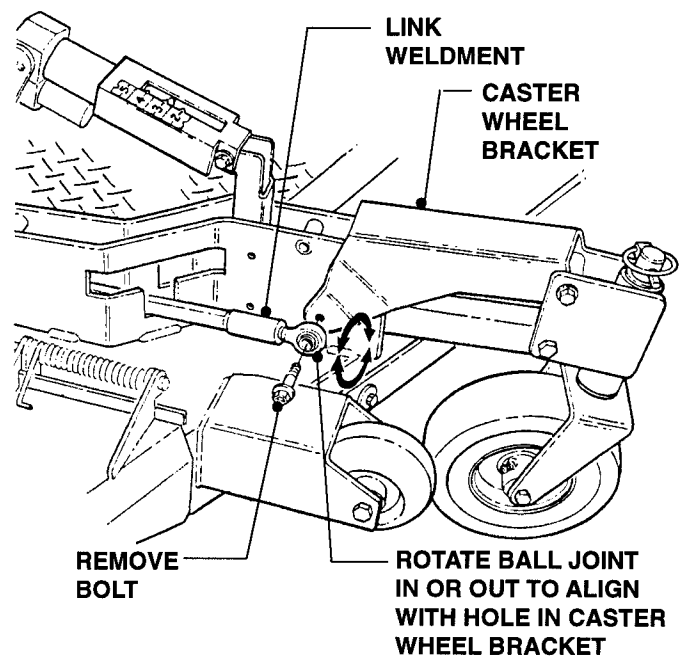


FIGURE 8.9

SERVICE - OUT FRONT Z-RIDER

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

7. Turn Ball Joint in or out until Ball Joint Anchor Hole aligns with Mounting Hole. Reinstall Bolt and tighten securely. Use same procedure on other Caster Wheel. (Refer to Figure 8.9).
8. Remove blocks from under front of Deck.

B. SIDE-TO-SIDE LEVEL

Check Blade Tips by rotating Blades until Tips are pointing to the side of the Deck. Check the measurement of outside Blade Tips to the ground on both Blades. The measurement of each outside Blade Tip should be within 1/8" of each other.

C. FRONT-TO-REAR LEVEL

Check Blade Tips by rotating Blades until Tips are pointing to the front and rear of Deck. Check the Blade Tip measurements of each Blade. Front-to-rear measurement should be 1/4" to 3/8" higher in the rear. See Figure 8.10.

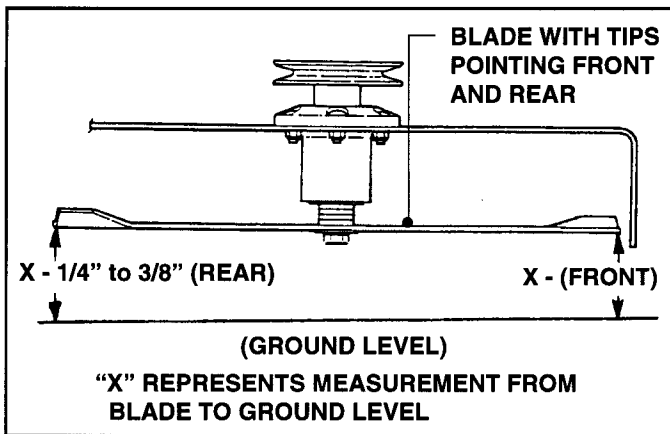


FIGURE 8.10

8.3 CUTTING HEIGHT ADJUSTMENT

- A. The cutting height can be adjusted with the Switch located on the Right Side Console. Move Switch "UP" to raise Deck or move Switch "DOWN" to lower the Deck. See Figure 8.11.

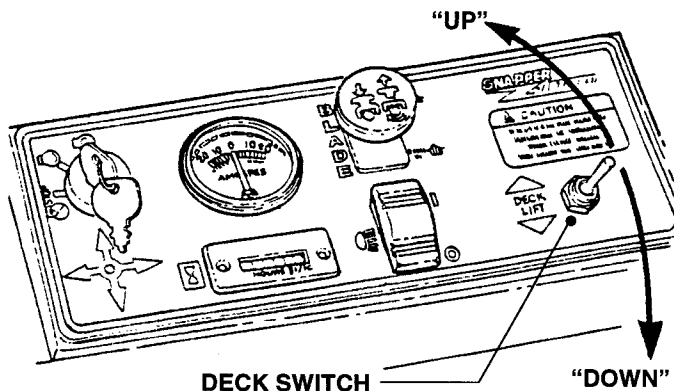


FIGURE 8.11

- B. When Deck is at desired cutting height, release Switch and observe Height of Cut Decal located on the upper right top side of the Deck. See Figure 8.12.

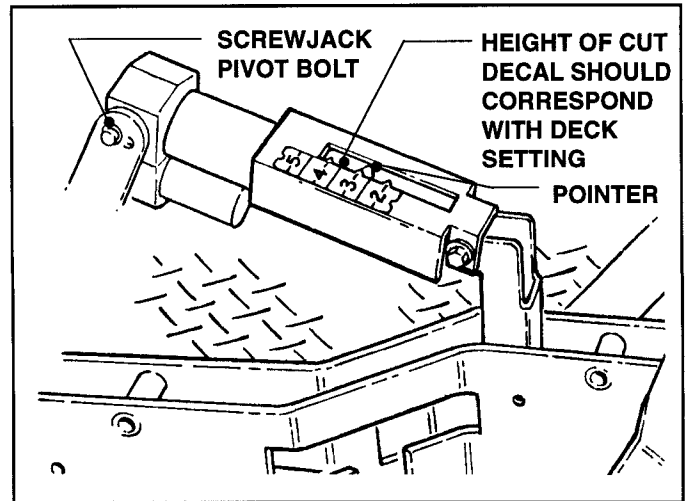


FIGURE 8.12

NOTE

The Engine does not have to be running to adjust cutting height, but Key Switch must be in the "ON" position.

- C. Check to make certain that Blade-to-Ground distance is the same as indicated on Height-of-Cut Decal. If not, loosen the Screwjack Pivot Bolt and adjust Pointer to correct reading on Decal. Refer to Figure 8.12.

8.4 DECK REMOVAL



WARNING



Before attempting any adjustments, maintenance, service, or repairs, stop Engine and Blade. Always remove Key from Ignition Switch, remove Spark Plug Wire(s) and secure Wire(s) away from Spark Plug(s).

Move Power Unit/Mower Deck to an area where the Mower Deck is to be disconnected. Turn Engine "OFF", but leave Keyswitch in the "ON" position. Engage Parking Brake.

- A. The rear of Deck must be raised up or both Jack Stands moved down to the lowest position and both Locking Pins inserted. See Figure 8.13 on following page.

NOTE

Jack Stands are located on the left and right rear sides of the Mower Deck.

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

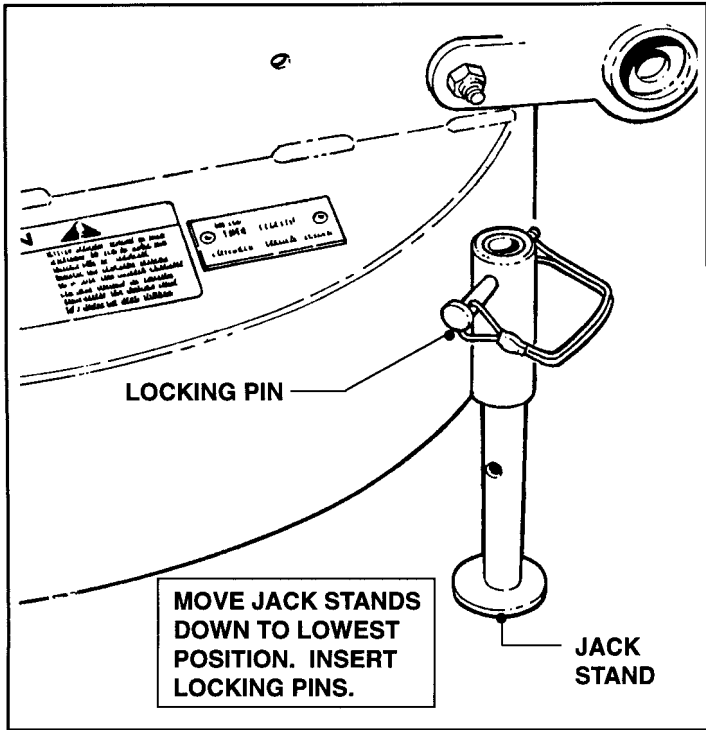


FIGURE 8.13

- B. Using the Deck Lift Switch, lower the Deck until it rests on the Jack Stands.
- C. The Hitch Latch Pins are shown in the latched position. The latched position locks the Deck Lift Arm into position. See Figure 8.14.

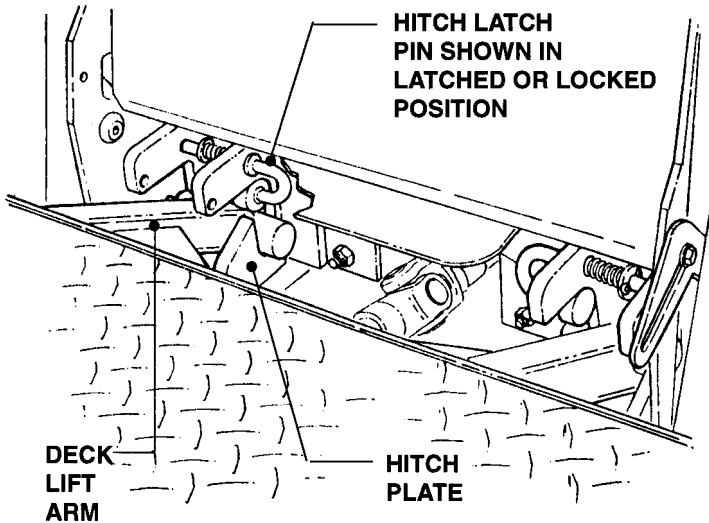


FIGURE 8.14

- D. Rotate spring-loaded Hitch Latch Pins (located on both Hitch Plates) to the unlatched position. See Figure 8.15.

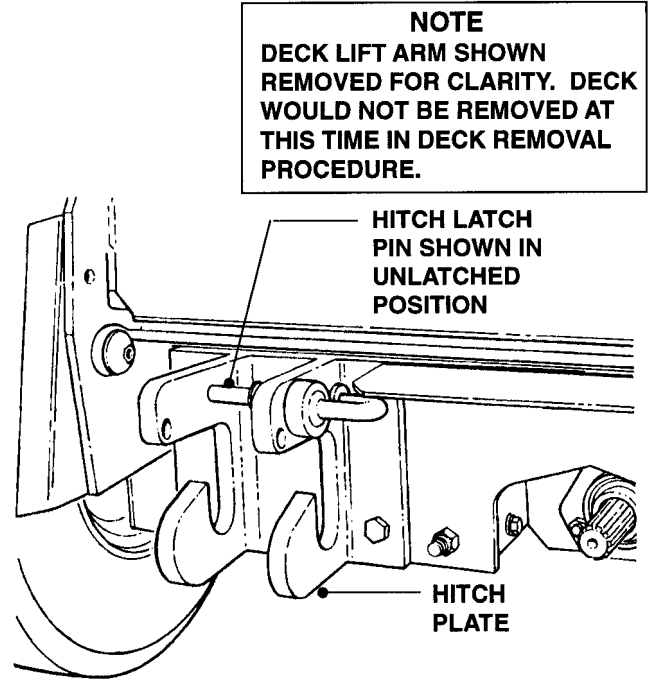


FIGURE 8.15

- E. Move Deck Lift Switch as if to lower Deck and the Lift Arm will move up in the Hitch Plates. The Lift Arm needs to be high enough to clear the Hitch Plates when Power Unit is driven backward away from Mower Deck. Refer to Figure 8.15.
- F. Turn Switch Key to "OFF" position.
- G. Pull Lock Collar back and slide Power Transfer Shaft away from Power Take Off (PTO) Shaft. See Figure 8.16.

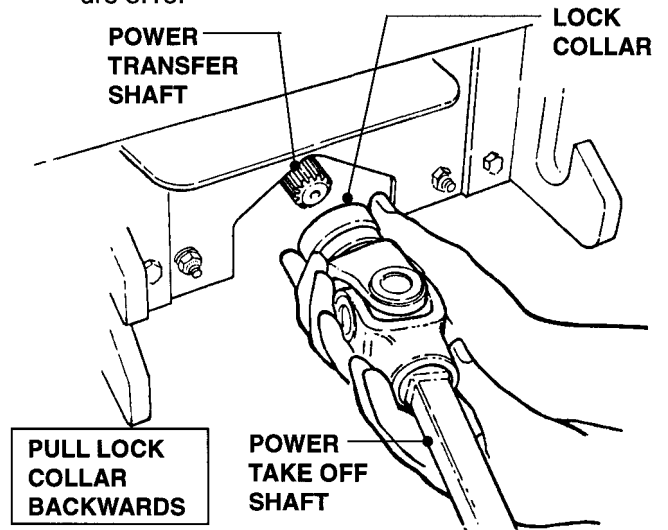


FIGURE 8.16

- H. Disconnect Wiring Harness from Mower Deck.
- J. Start Power Unit. Disengage Parking Brake. Carefully move Power Unit backward away from Mower Deck.

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

8.5 DECK COMPONENTS REPAIR (52" & 61" DECKS)

The 52" & 61" Decks found on the SNAPPER OUT FRONT Z-RIDERS have interchangeable components with the following exceptions (see Chart below):

PART No.s DECK MODEL DESCRIPTION

4-2898	ZF5200M	DECK, 52"
4-2651	ZF6100M	DECK, 61"
4-2776	ZF5200M	BELT, 52" HB (122")
3-5542	ZF6100M	BELT, 61" HB (134-1/2")
4-6728	ZF5200M	COVER, 52" DECK
4-6729	ZF6100M	COVER, 61" DECK
1-0008	ZF5200M	KEY, #6 WOODRUFF
9-1826	ZF6100M	KEY, 5/32 x 5/8" WOODRUFF
4-2903	ZF5200M	DEFLECTOR, CHUTE (52")
4-2656	ZF6100M	DEFLECTOR, CHUTE (61")
4-2914	ZF5200M	BAFFLE, FRONT (52")
3-6445	ZF6100M	BAFFLE, FRONT (61")
4-2901	ZF5200M	LINK, WLDMNT, L.H. (52")
4-2661	ZF6100M	LINK, WLDMNT, L.H. (61")
4-2900	ZF5200M	LINK, WLDMNT, L.H. (52")
4-2662	ZF6100M	LINK, WLDMNT, R.H. (61")
4-2867	ZF5200M	PULLEY, CAST 5 3/4" O.D. (52")
3-5788	ZF6100M	PULLEY, CAST 5.45 O.D. (61")

NOTE

The geometry of the Belting arrangement found on the 52" & 61" Decks is such that the Mower Belt maintains 80 lbs. detent pressure at all times. Improper lubrication, neglect of apparent problems and constant abuse of the Mower Deck will result in its being sent to your repair shop with one or more of the following problems:

A. PROBLEM - EXCESSIVE BELT WEAR

1. Remove Mower Belt.
2. Check Idler Pulley for correct operation:
 - a) Does it spin freely when turned by hand?
 - b) Does it "wobble" when turned?
 - c) Is it difficult to turn?
3. If the Idler Pulley spins freely, it is O.K. If it wobbles, or is difficult to turn, it must be replaced. See Figure 8.17.

IMPORTANT!

USE ONLY GENUINE SNAPPER PARTS WHEN REPLACING ITEMS ON THE ZF5200M & ZF6100M MOWER DECKS. DO NOT SUBSTITUTE AN AFTERMARKET PART FOR ANY ITEM FOUND ON EITHER DECK!

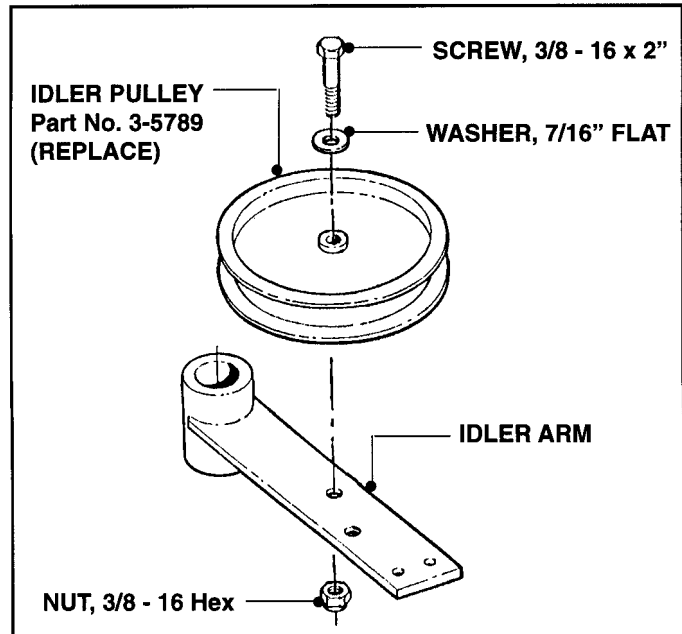


FIGURE 8.17

4. Check Idler Arm to make certain that it pivots easily.
5. If it does not, lubricate Pivot area through Grease Fitting, located at rear of Idler Arm. See Figure 8.18.

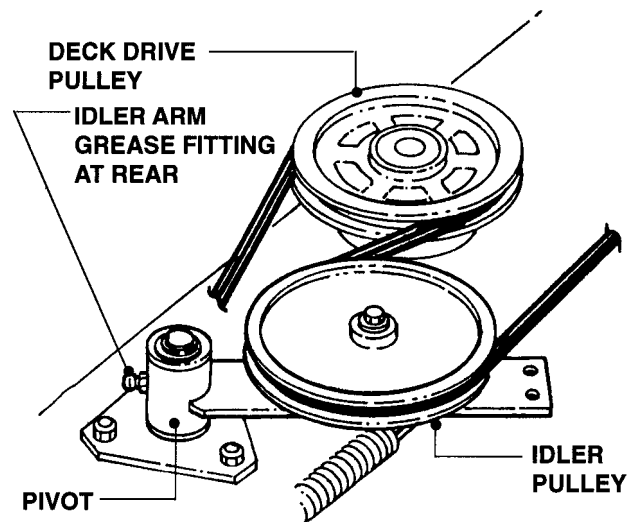


FIGURE 8.18

6. If the Idler Arm is still difficult to pivot, remove it from the Pivot and check the Bushings and Pivot Shaft for damage. See Figure 8.19. Replace parts as required.

NOTE

The Idler Arm may "Freeze--Up" on the Pivot Shaft due to lack of lubrication.

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

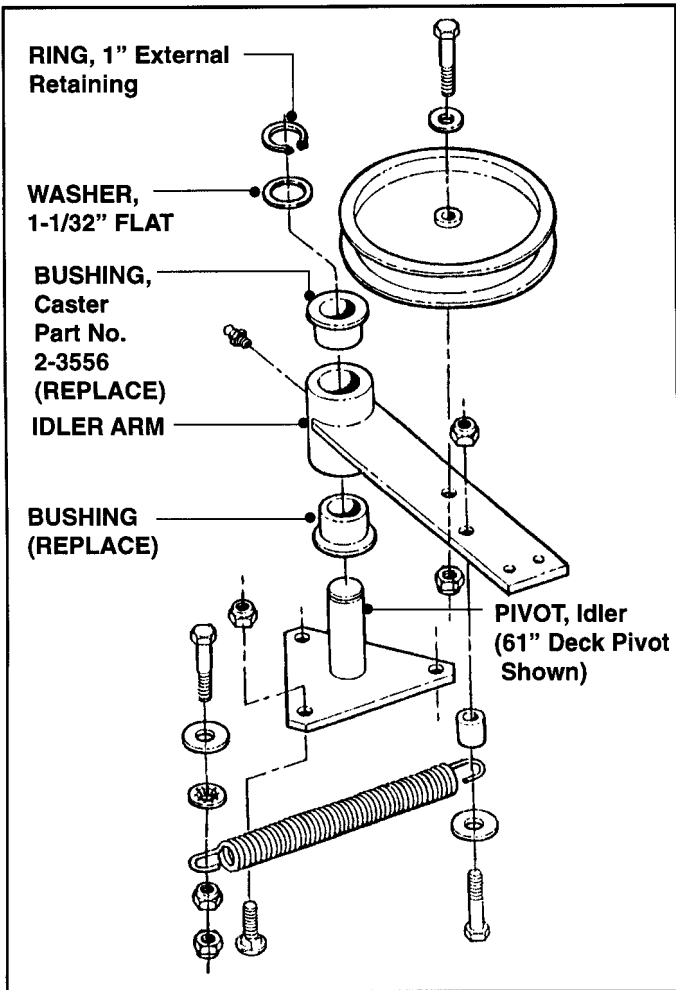


FIGURE 8.19

NOTE

Refer to SNAPPER PARTS MANUALS No. 06113 (Rev. 3, 1/14/00) & No. 06106 (Rev. 2, 11/97) for further assistance.

7. Check the front Idler Pulley for "free-turning" also. Replace parts as required. See Figure 8.20.

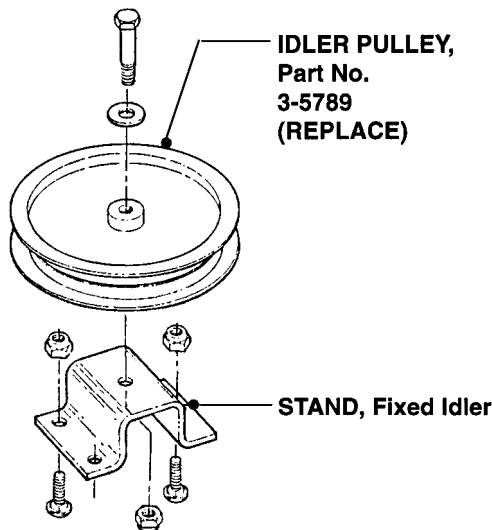


FIGURE 8.20

8. Check the Cutter Housing Assemblies. If they turn freely when spun by hand, they are O.K. If not, see Section IX, CUTTER HOUSING ASSEMBLIES, for repair information.

B. FRONT BAFFLE (52" & 61" Decks)

The Front Baffle may be used as a LIP BAFFLE or DUST BAFFLE by simply reversing its position on the Deck.

1. LIP BAFFLE (Lip Turned Outward)

Best position of Baffle for use in lush grass during summer or fall. See Figure 8.21.

2. DUST BAFFLE (Lip Turned Inward)

When in this position, the Baffle helps prevent dusting conditions during arid times of year. Also, it helps pull dust into Mower Deck and out Discharge Chute.

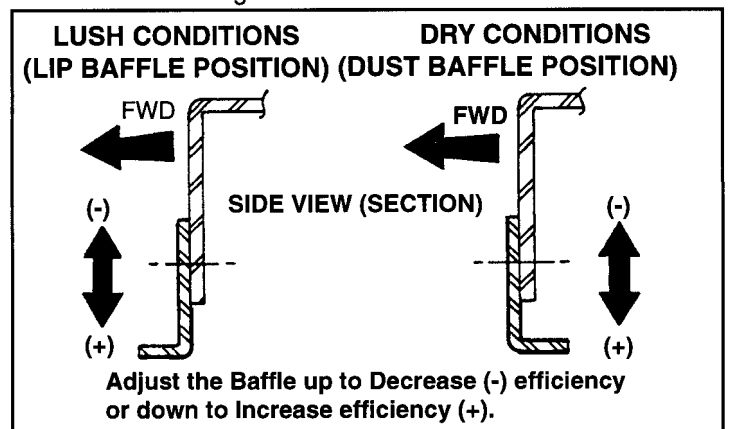


FIGURE 8.21

8.6 DECK WELDMENT REPAIR (52" & 61" DECKS)

If a Deck develops a broken weld or is punctured due to an accident while mowing or during transport, repair Deck as follows:

A. WELDING DECKS

When making welding repairs, the use of an Electric Stick Welder is recommended. Although the welding job is easier when using either 6010 or 0613 welding rods, the job can be completed faster by using the larger 7018 rods. In either case, always set the welder "Heat" at the appropriate number for each rod.

1. Thoroughly clean area to be welded. Use a grinder to dress parts to be joined.
2. Making sure that the parts are properly aligned, clamp or otherwise secure them in position.
3. Tack-weld the area as required to prevent warping. Check alignment frequently.
4. Weld area closed.
5. Grind and sand welded area.
6. Prime and paint.

(Continued on following page)

Section VIII - 52" & 61" MOWER DECK ASSEMBLIES

NOTE

When welding Deck components fabricated from thinner metals, the use of a Wire Welder is recommended. Use .035 Wire for most jobs.

B. STRAIGHTENING BENT DECKS

If a Deck becomes bent during operation or transport, it can usually be restored to near-original condition by a mechanic who is familiar with metalworking. Observe the following when straightening Decks.

1. Avoid using a torch to "relieve" the damaged area for straightening. This will cause the heated area to lose temper.

NOTE

Because of the strength and thickness (#7 GA) of the steel used in making the 52" & 61" Deck Weldments, most damage is generally confined to the Blade Baffles on the underside of the Deck or the Discharge Chute.

2. If straightening a bent Blade Baffle, it is best to remove all Deck components and lay the Deck Weldment upside-down on a firm, level surface.
 - a) Using shop hammers of varying weights with appropriately-sized dollies, "work-out" the bent areas of the Blade Baffle until its inner circumference matches that of an undamaged Baffle.
 - b) The circumference may be checked with a cardboard pattern taken from an undamaged Baffle.
 - c) Any welding of the Blade Baffles or Discharge Chute should be done with the Wire Welder.
 - d) After work has been completed on the Deck, turn it back over - right-side-up - and check to make sure that all of the Deck Skirt is in contact with the level work surface.
3. If the Deck Skirt is not level with a proven level surface, straighten the Deck Weldment until the Skirt is in full contact with surface.

NOTE

To avoid repainting after straightening a Deck, the paint can *sometimes* be preserved by coating the affected area with GP grease before beginning the straightening process. Wipe off excess grease after completing job.

Section IX

CUTTER ASSEMBLIES

CONTENTS

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Blade Installation	9.2 - 9.3
Cutter Housing Assembly - 52" & 61" Decks	9.3 - 9.4
Cutter Housing Assembly Replacement	9.3
Cutter Housing Assembly Rebuild/Overhaul	9.4 - 9.5
Special Recycling Blade (NINJA) Wear Limit	9.4
Blade Removal & Sharpening (NINJA)	9.4 - 9.5
Blade Installation (NINJA)	9.5
Mower Drive Belt Replacement	9.5
Belt Removal	9.5
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Belt Replacement	9.5
Parts Sheet (Cutter Housing Assembly - 52" & 61" Decks)	9.6

Section IX - CUTTER HOUSING ASSEMBLIES

INTRODUCTION

Whenever a unit is brought in for service, the Mower Blade and Cutter Housing Assemblies should be checked for wear or damage. If the Blades require attention, they must be removed from the Spindle for repair/replacement. On the other hand, it is not necessary to remove the Cutter Housing from the Mower Deck in order to overhaul the Deck Spindle Assembly.

9.1 CUTTING BLADE SERVICE

- A. When performing Service on a Mower Unit, be sure to check the Cutting Blades for damage or signs of excessive wear. See Figure 9.1 for Blade wear limits.

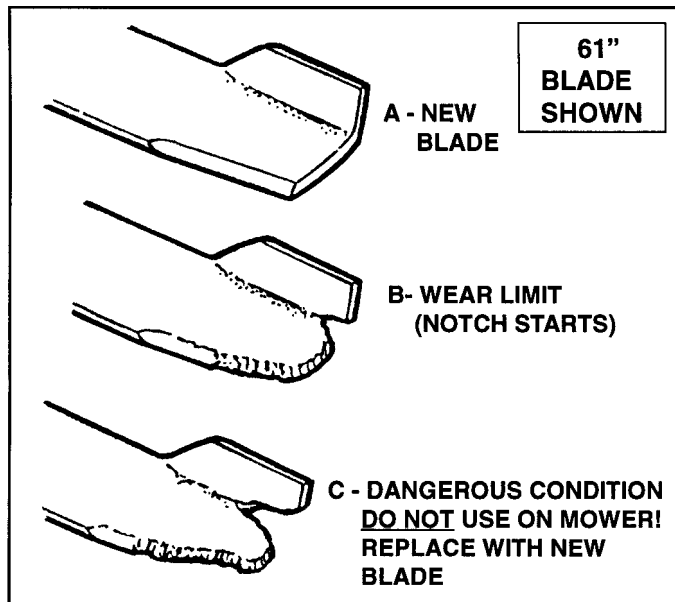


FIGURE 9.1

B. PART No.'s - CUTTING BLADES

2-9245	BLADE, 18" (52" DECK)
1-7081	BLADE, 21" (61" DECK) (Low Lift)
2-9251	BLADE, 21" (61" DECK) (High Lift)

WARNING

Never allow a customer to take a mower out of your repair shop with a Cutting Blade worn to the extent shown in Illustration "C" of Figure 9.1, without warning that customer of the danger that a tip could fly off and cause either personal injury or property damage.

9.2 BLADE REMOVAL AND SHARPENING

- A. With Engine OFF, remove Key and disconnect Spark Plug Wires from Spark Plugs. Secure wires away from plugs.
1. Remove Floor Pan (If Deck is left attached) when removing Center Blade.
 2. Either remove Mower Deck or elevate front of Unit high enough to allow for Blade Removal underneath Deck.

3. Remove Spindle Covers (if required).
4. Remove Mower Drive Belt.

CAUTION

Avoid cutting yourself on a sharp Blade!
Wear gloves to protect your hands while handling the Blade.

- B. Remove Blade.
- C. Clean and inspect each Blade for excessive wear and damage. Refer to Figure 9.1.
- D. Should Blades be in acceptable condition, sharpen at 25 to 30 degrees. DO NOT sharpen beyond existing cutting edge. See Figure 9.2.

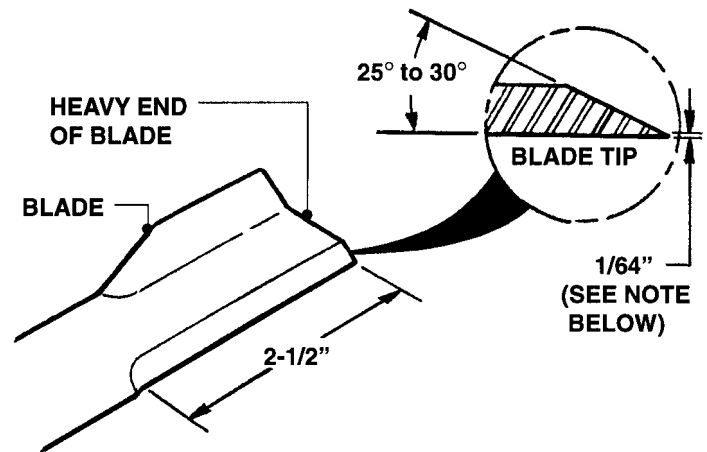


FIGURE 9.2

NOTE

When sharpening Blades, leave 1/64" untouched. Razor sharp Blades dull quicker and damage easier. Commercial Balancers are available and should be used in accordance with manufacturer's instructions.

- E. Balance each Blade after sharpening by grinding metal from the heavy end of the Blade.

WARNING

The use of aftermarket or "Universal" Blades may adversely affect mower performance and/or safety.

9.3 BLADE INSTALLATION

- A. Insert Blade Mounting Bolt through Bevel Washer and into Blade. Place Blade Spacers over Bolt. Make certain each Blade is installed with the same amount of Spacers as removed. See Figure 9.3.
- B. Install Blade Mounting Bolt with Spacers and Blade into Spindle.
- C. Install an equal amount of Blade Spacers on top of each Blade Mounting Bolt.

(Continued on Following Page)

Section IX - CUTTER HOUSING ASSEMBLIES

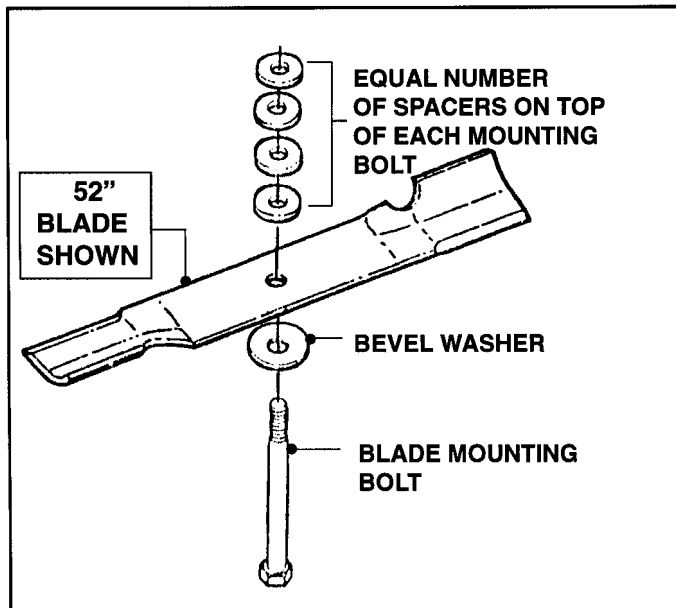


FIGURE 9.3

- D. Install Spindle Washer and Nut on Blade Mounting Bolt.
- E. Torque each Blade Mounting Bolt and Nut to 70 to 80 ft. lbs. of torque (95 to 109 N•m).

9.4 CUTTER HOUSING ASSEMBLY - 52" & 61" DECKS

The Cutter Housing Assembly can be replaced as an assembly or rebuilt using individual replacement parts. The following procedures are outlined separately and can be performed with the Mower Unit attached to the Power Unit.

9.5 CUTTER HOUSING ASSEMBLY REPLACEMENT

- A. Either remove Mower Deck or elevate front of Unit high enough to allow for Blade removal from underneath Deck.
- B. Remove Mower Drive Belt.
- C. Remove Spindle Nut, any Spacers and Spindle Washer from top of Spindle. See Figure 9.4.
- D. Remove Blade Bolt, Beveled Washer, Blade and any Blade Spacers. Refer to Figure 9.3.
- E. Remove the six (6) 3/8 - 16 Hex Flange Lock Nuts securing the Cutter Housing to the Deck and remove Cutter Assembly.
- F. Reverse above steps to install replacement Cutter Assembly.

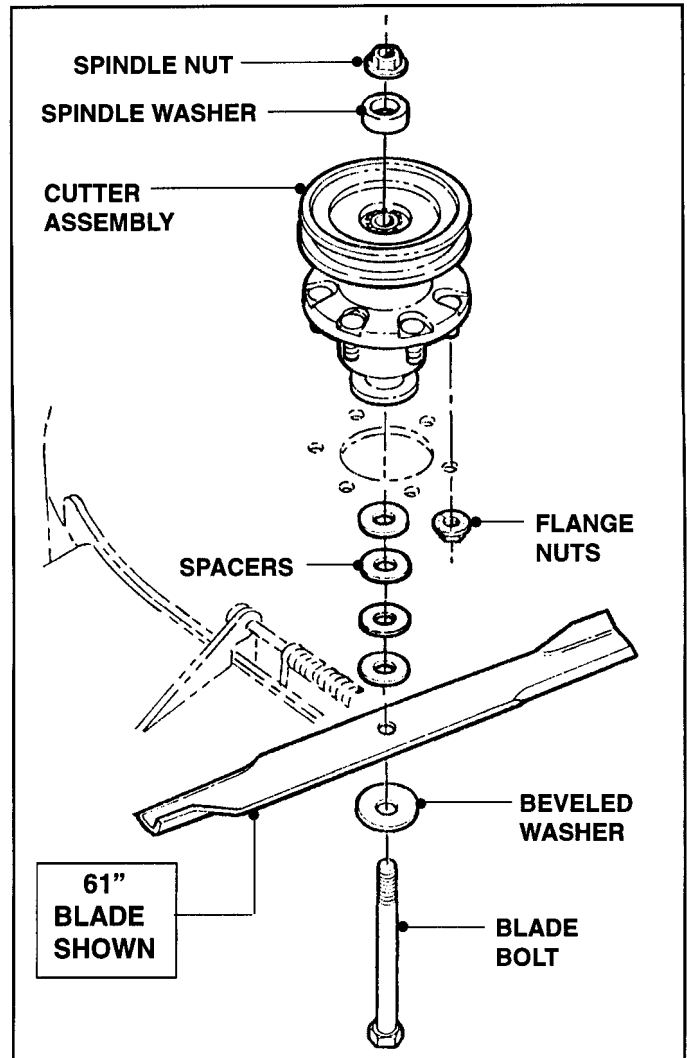


FIGURE 9.4

9.6 CUTTER HOUSING ASSEMBLY REBUILD/OVERHAUL

- A. Remove Cutter Housing Assembly as described in "Cutter Housing Assembly Replacement".

NOTE

Cutter Housing Assembly may be overhauled without removal from Mower Deck. Remove Blade (see 9.2 BLADE REMOVAL, etc.), then proceed with Item B as follows:

- B. Remove Spindle Washer. See Fig. 9.5 on Pg. 9.4.
- C. Remove Pulley and Snap Ring.
- D. Using a soft-faced mallet, tap the top of the Spindle downward until the Spindle, Lower Bearing and Spacer are free of the Cutter Housing.
- E. Remove Upper Bearing.
- F. Clean and inspect all components for damage or wear. Replace components as required.
- G. Install components in reverse order.
- H. Torque Blade Bolt and Spindle Nut to 70 to 80 ft. lbs. of torque (95 to 109 N•m).
- J. Fill Cutter Housing Assembly with grease.

Section IX - CUTTER HOUSING ASSEMBLIES

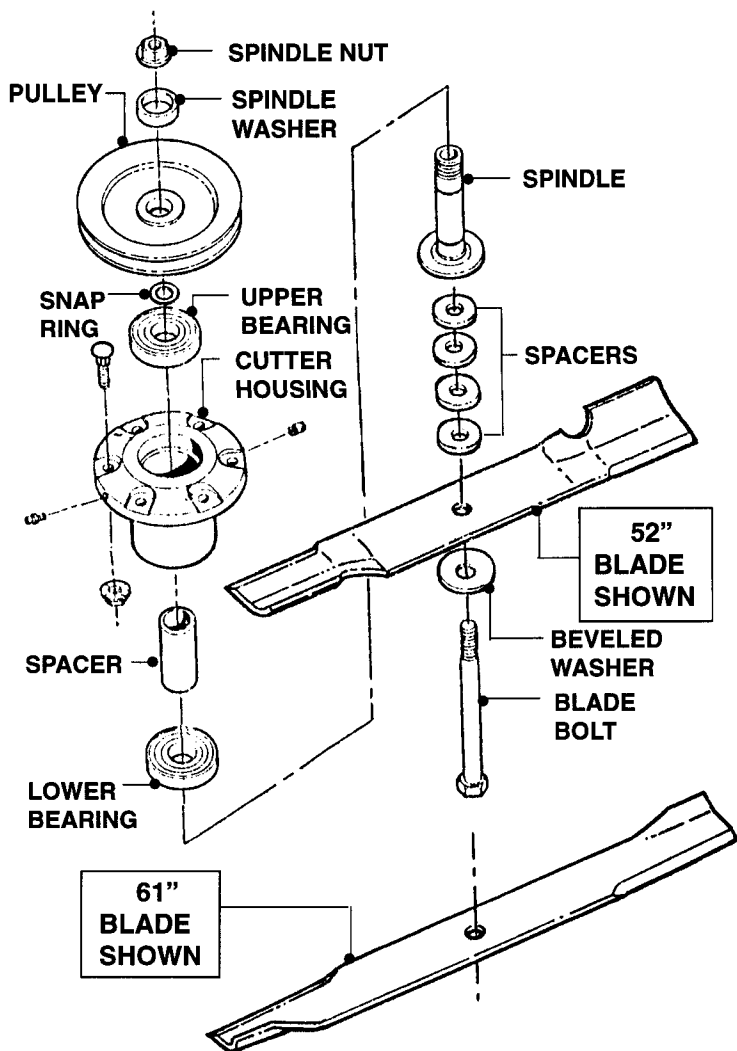


FIGURE 9.5

9.7 SPECIAL RECYCLING BLADE (NINJA) WEAR LIMIT

- A. The special Recycling Blade (NINJA) is used on those mowers set up for mulching. This blade **MUST** be inspected for wear and damage each time one of these mowers is brought in for repair.
- B. Consult the Blade Drawings shown in Figure 9.6 to determine if a blade can be sharpened and safely reused, or if it must be replaced with a new part. Consult the SNAPPER "ACCESSORIES" Manual for Part No.
- C. Refer to 9.8, BLADE REMOVAL AND SHARPENING (NINJA).

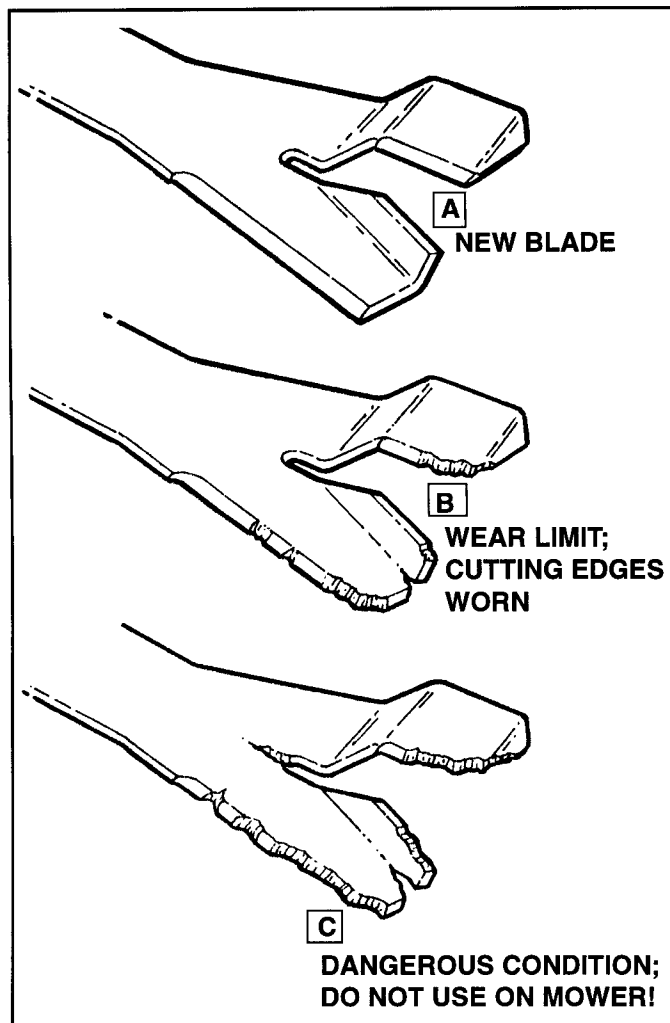


FIGURE 9.6

9.8 BLADE REMOVAL AND SHARPENING (NINJA)

A. Remove Blade(s).

⚠

CAUTION

⚠

Wear heavy gloves to avoid cutting yourself when handling blades!

- B. Clean and inspect Blades for excessive wear or damage. Refer to Figure 9.6.
- C. Sharpen both cutting edges on each end of the Blade at an angle of 22 to 28 degrees. The cutting surface should extend inward about 4-1/2" from the tip of the lower cutting edge and as far as practical from the tip of the upper cutting edge. See Figure 9.7 on Page 9.5.

NOTE

Regardless of the location of the Blade Spacers, **when the blade is removed, all** Spacers should be placed at the bottom of the Spindle when replacing the Blade. This arrangement will provide a "low-as-possible" cut.

Section IX - CUTTER HOUSING ASSEMBLIES

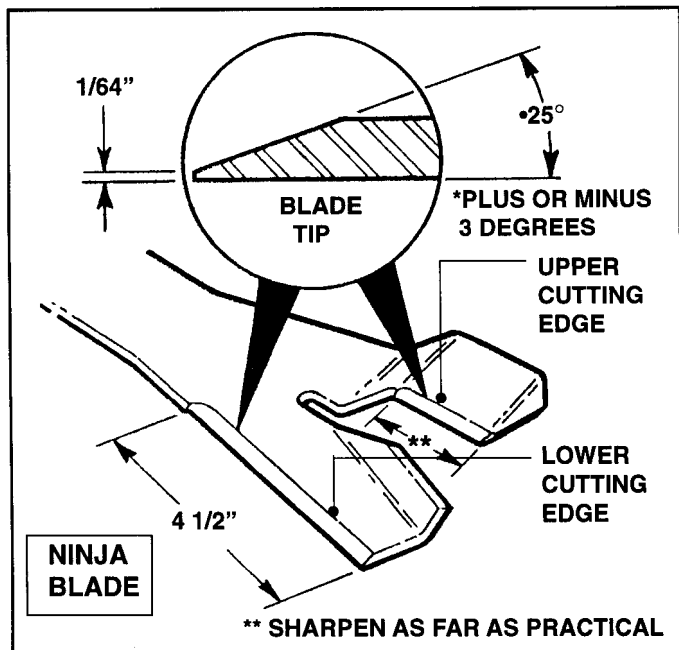


FIGURE 9.7

9.9 BLADE INSTALLATION (NINJA)

- Place the Blade Mounting Bolt through Bevel Washer and Blade.
- Install all Spacers on top of Blade. See Figure 9.8.
- Install Blade Mounting Bolt with Blade and Spacers into Spindle.
- Install the Blade Mounting Nut on each Blade Mounting Bolt.
- Torque each Blade Mounting Bolt and Nut to 60 to 75 ft. lbs. of torque (81 to 102 N•m).

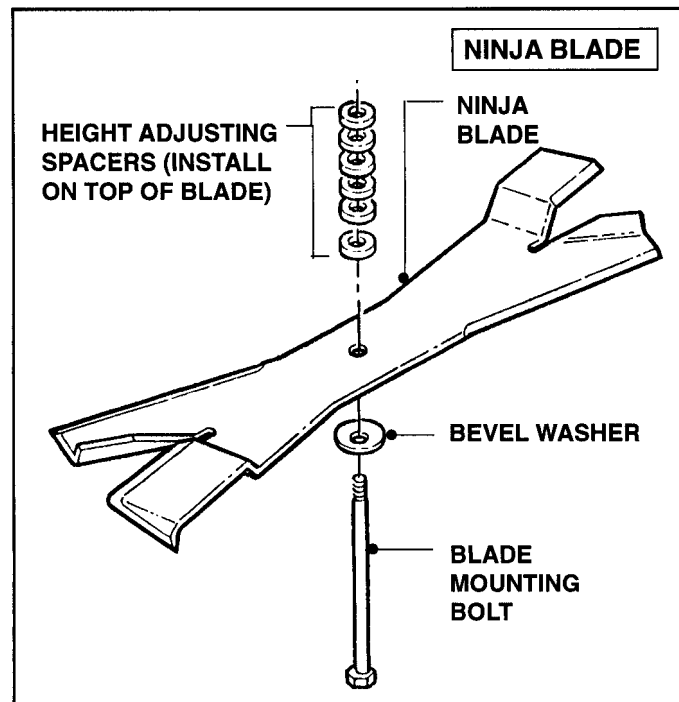


FIGURE 9.8

NOTE

Make certain that all Spacers are installed on top of Blade and under the Spindle.

9.10 MOWER DRIVE BELT REPLACEMENT

Inspect Mower Drive Belt. Replace Belt if it shows signs of excessive wear, damage and/or is broken.

A. BELT REMOVAL

- Remove Power Unit Foot Rest.
- Remove old Belt.

B. PART No.'s - MOWER DRIVE BELT

- 4-2776 BELT, 52" HB DRIVE (122")
- 3-5542 BELT, 61" HB DRIVE (134 1/2")

C. BELT REPLACEMENT

- Route Belt around Blade Pulleys and Idler Pulley in same direction as old Belt was removed. It may be necessary to use a pry bar to pull Idler Pulley back to install Belt. See Figure 9.9.

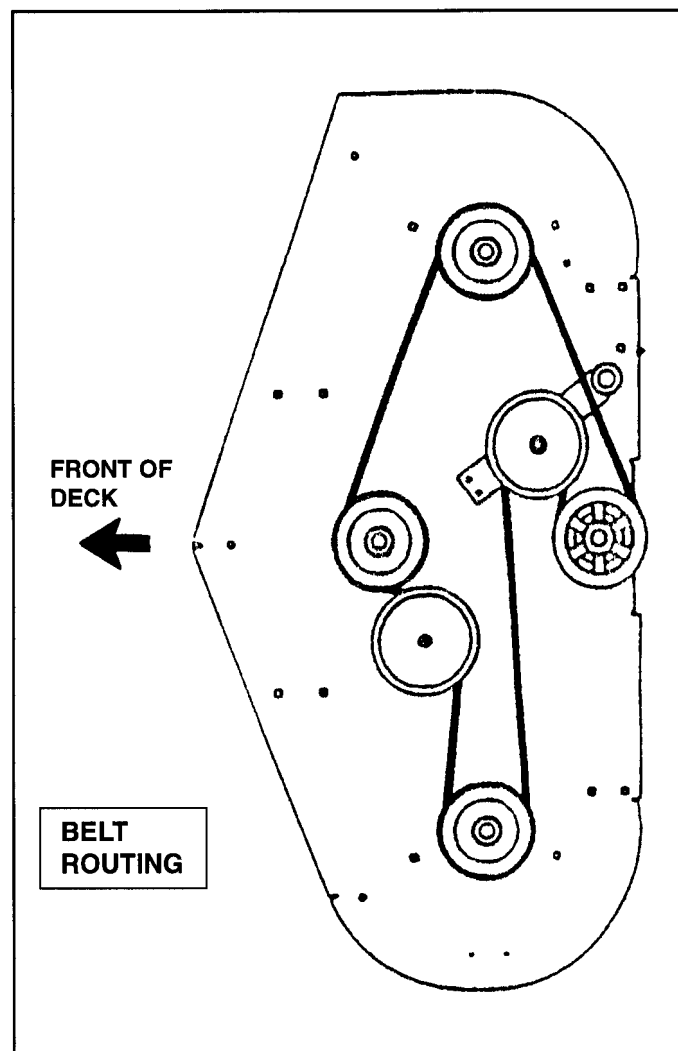
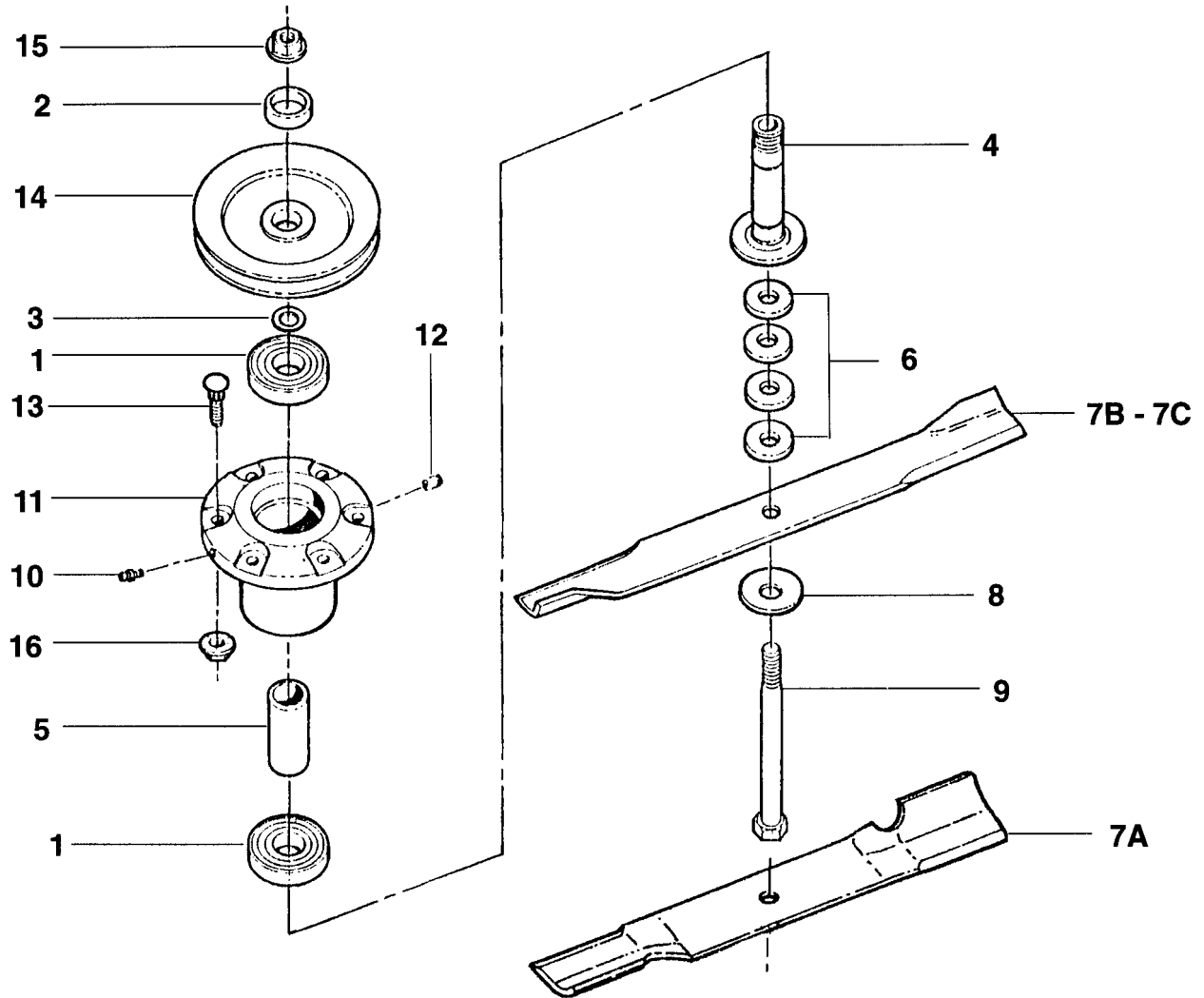


FIGURE 9.9

Section IX - CUTTER HOUSING ASSEMBLIES

PARTS SHEET

(CUTTER HOUSING ASSEMBLY - 52" & 61" DECKS)



ITEM	PART NO.	DESCRIPTION
1	2-9422	BEARING, Sealed (2)
2	2-9270	WASHER, Spindle
3	2-9274	SNAP-RING, Spindle Shaft
4	2-9253	SHAFT, Spindle
5	2-9254	SPACER, Bearing
6	2-9271	SPACER, Blade (4)
7A	2-9245	BLADE, 18" (52" Deck)
7B	1-7081	BLADE, 21" (61" Deck) (Low Lift)
7C	2-9251	BLADE, 21" (61" Deck) (High Lift)
8	1-6440	WASHER, Beveled
9	2-9256	BOLT, 5/8 - 18 x 7-1/2" Hex Head Cap, Grade 5
10	2-9275	FITTING, Lube
11	2-9252 R/B 5-8237	HOUSING, Cutter
12	2-9384	VENT, Spindle
13	2-9302	BOLT, 3/8 - 16 x 1-1/4" Rib Necked (6)
14	2-9249	PULLEY, 5-3/4" O.D. (52" Deck)
15	9-1736	NUT, 5/8 - 18 Hex Flange, Grade 5
16	9-1299	NUT, 3/8 - 16 Hex Nyloc (6)

Service Manual for

SNAPPER[®]

OUT FRONT Z-RIDER



WARNING:

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

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MANUAL No. 07225 (I.R. 4/00)

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